JOURNAL

OF THE

American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

H. Preston Hoskins, Secretary-Editor, 537 Book Building, Detroit, Mich.

MAURICE C. HALL, President, Washington, D. C. M. JACOB, Treasurer, Knoxville, Tenn.

Executive Board

R. S. MACKELLAR, Member-at-Large and Chairman;
T. H. FERGUSON, ex officio; MAURICE C. HALL, ex officio;
GEO. HILTON, 1st District; E. P. ALTHOUSE, 2nd District; L. A. MERILLAT, 3rd District;
C. A. CARY, 4th District; C. P. FITCH, 5th District; GEO. H. HART, 6th District;
C. H. HAYS, 7th District; N. F. WILLIAMS, 8th District; D. H. UDALL, 9th District;
O. V. BRUMLEY, 10th District.

The American Veterinary Medical Association is not responsible for views or statements published in the JOURNAL, outside of its own authorized actions.

Reprints should be ordered in advance. Prices will be sent upon application.

Vol. LXXVIII, N. S. Vol. 31 May, 1931 No. 5

A PRACTITIONER SPEAKS OUT

In his presidential address, before the thirty-third annual meeting of the Nebraska State Veterinary Medical Association, in December, Dr. Floyd Perrin, of Lincoln, gave expression to a number of opinions which should receive some serious thought, not only upon the part of Nebraska veterinarians, but upon the part of the profession generally. For the benefit of those who are not personally acquainted with Dr. Perrin, we would like to mention that he is one of the outstanding practitioners of his part of the country.

Early in his address, Dr. Perrin stated that he had come to the conclusion that there are two general questions which should command the attention of veterinarians: First, how to increase our professional qualifications and thereby our field of usefulness to the live stock industry and, second, how to make a living while pursuing our vocation. As pointed out by Dr. Perrin, answers to both of these questions are more or less interwoven, and one might say that by successfully answering the first question, the second would automatically be answered. Of course, such a conclusion would necessarily be predicated on the assumption that owners of live stock would be ready to place the proper appreciation upon any increase in the value of the services that

veterinarians would be enabled to render, as a result of improving their own professional qualifications.

In considering the factors involved in bringing about this much-to-be-desired state of affairs, we must not lose sight of the unsatisfactory situation with which members of the medical profession are at present confronted. We refer to the condition wherein the cost of first-class medical service is becoming almost prohibitive to the large middle class, while at the same time practicing physicians are complaining of net incomes that are entirely inadequate, considering the cost of securing their education and maintaining themselves as professional men.

A workman is worthy of his hire and we would very much dislike to think that the owners of live stock, generally, will continue to look upon the veterinary profession in the same light that the profession was regarded a quarter of a century ago. Evidence is slowly accumulating to indicate that stockmen and farmers generally are beginning to place the proper value on strictly professional veterinary service. However, it must be kept in mind that most patients of veterinarians have a market value, and there necessarily must be some relation between the value of these animals and what the owner can afford to expend on them for veterinary services. As the market value declines, there is always a tendency toward reducing cost of production, and too frequently a short-sighted policy suggests the curtailment of the visits of the veterinarian.

Dr. Perrin pointed out that nearly every individual judges a profession by what that individual's contact has been with the profession in question. Dr. Perrin questioned the advisability of veterinarians advertising their standard of ideals until such time as nearly all members of the profession attain that standard. Undoubtedly he had in mind the fact that veterinary service falls far short of being a standardized commodity. Unfortunately too much veterinary service does not measure up to modern standards. Dr. Perrin attempted to differentiate between what he considered ethical publicity for the profession in general and the advertising of "practice stunts" by individual veterinarians. Dr. Perrin quoted the late Dr. V. A. Moore, who once said:

> The relation a profession holds to truth, its respect for facts, its adherence to ethical conduct and the abiding faith of its members in honest service determine very largely its place, usefulness and power in the world.

This statement is just as true today as the day Dr. Moore made it.

Dr. Perrin closed his address with the statement that in his opinion the future prosperity of the veterinarian would depend very largely upon four things:

1. A prosperous live stock industry.
2. Our ability to adjust ourselves to changing conditions.
3. The curtailment of empiricism whether without or within the profession.
4. Coöperation between all recognized branches of veterinary science.

We take this opportunity to compliment Dr. Perrin on his analysis of the present situation and his look into the future. The following comments appear appropriate at this time:

Veterinarians have contributed a large share toward making our live stock industry a fairly safe enterprise for the investment of capital. A competent veterinary service insures a productive animal industry, without which agriculture can not be prosperous. Unfortunately we have not been able to control the economic factors which play such a large part in determining the degree of prosperity of the industry.

Most veterinarians have shown their ability to adjust themselves to changing conditions, such as we have faced during the last two decades. Some, not so well grounded educationally, have had rather a tough time getting adjusted. Some never will. A heavy two-fold responsibility now rests on our veterinary colleges. These institutions must adjust their curricula to present and future needs, as far as undergraduate instruction is concerned, and at the same time provide postgraduate courses for those who wish to return for further study for variable periods of time.

Empiricism is one of the worst evils that can undermine ours or any other profession. Veterinary medicine has had its share of empiricism, which is only another word for charlatanry or quackery. Perhaps Dr. Perrin is not enough of a Utopian to believe that empiricism will ever be entirely eradicated, and for that reason he will be satisfied with curtailment, in which most of us will concur.

Happily there are many evidences of real coöperation between the various branches of the profession. There have been differences of opinion and there has been some friction in the past, but these are rapidly disappearing. It is doubtful if there is another profession where there is as great a unity of purpose or as great a community of interest as among veterinarians. The future holds

forth wonderful opportunities for useful service, but these will not come to full fruition if we leave it to others to shape our course. That particular responsibility is largely our own.

STATE MEDICINE

In the medical profession a situation has developed in which one finds the national association of physicians, the American Medical Association, more or less committed to a position of hostility to the extension of state medicine, although many physicians in and out of that organization either approve and welcome the extension of the activities designated as state medicine or regard such extensions as inevitable and not entirely to be deplored. American veterinarians have taken no position on this question through their national organization, the American Veterinary Medical Association, and it is to be hoped that they will not do so.

There are various reasons why the veterinary profession as a whole should not take sides in this matter, especially at this time. In the first place this is a highly controversial subject and one on which opinions will be determined by individual points of view, and consequently a majority vote of the American Veterinary Medical Association could represent only a majority of persons having certain opinions, a sterile procedure unless the Association contemplated a program of active support for or hostility to state medicine. Before engaging in such a controversy one would wish to take into consideration many things. For one thing, both state medicine and private enterprise, like almost everything else, are things which have their advantages and disadvantages.

Among the advantages of state medicine may be noted the following: State medicine, as far as veterinarians are concerned, is the only thing which has given any promise of eradication or widespread control of disease; the income and profit from broad and basic research is usually of such a sort that, regardless of its great value to the nation as a whole, it can be financed only by governmental agencies and would have to be suppressed to a great extent if its existence depended on private support; many persons who have little interest in making money beyond the making of a living for themselves and their families, usually, though not always, persons of little financial ability, prefer a fixed income and do better work when they can give all their

time and attention to that work and not divert time or energy to financial matters; and state medicine has a continuity of effort that does not exist to the same extent in private medicine, since the life of the former is associated with the life of continuing organizations and the life of the latter with the life of individuals.

Among the disadvantages of state medicine are the following: It cannot take care of the troubles of the individual stockman and farmer, at least under present conditions or those likely to prevail in the immediate future; it cannot conduct the incidental research necessary for the effective maintenance of individual flocks and herds, or of commercial houses, or of similar things; it offers relatively small financial rewards for achievements of great importance and pays at times too great rewards for services of a trivial or at least a minor sort; it does not give the same freedom of thought and action that private practice gives, and does tend to build up red tape, individual restrictions, and other things which are properly looked on with disfavor by persons concerned about individual liberty.

The advantages of private practice and enterprise are, in part, the reverse of the disadvantages of state medicine. They include: the ability to help the individual farmer and stockman in a direct personal way; the ability to solve individual problems of research; the opportunity to make money somewhat in proportion to one's individual ability and business sagacity; and the freedom of thought, expression and action that appertains to a status in which one deals only with the public as individuals who temporarily employ one for specific purposes but in which one has no specific employer who is in a position to give orders and to "hire and fire." Probably the ability to make larger incomes is a dominant consideration with most of the persons who elect this status, but the desire for individual liberty is also an important motive in this group.

The disadvantages of private practice and enterprise include: the risk of financial failure as a result of inadequate professional or business ability; the uncertainty of income that follows from changing conditions, business depressions, and similar things; the necessity for giving to the psychology of the client and to business matters a degree of acquiescence, interest, energy and time which is often irksome to men whose interests are actually professional; and the irritation of unfair competition and criticism.

By and large our reactions to the advantages and disadvantages of state medicine and private enterprise will be determined by

our interests in life, our temperaments, and our training and education. Conceding that there is much to be said on both sides, it behooves the veterinary profession to keep an open mind on the matter of state medicine and to avoid committing our profession to a stand on this subject, regardless of our individual opinions. There is no crisis involving this subject at present and conditions in both state medicine and private enterprise, as far as veterinary medicine is concerned, are such that veterinarians in both groups coöperate well with one another, and may expect a still greater measure of coöperation if they work for it.

There is another very important reason why the veterinary profession should not take sides in this matter. The question as to whether we shall have more or less of state medicine is a matter subject to the action of powerful social, economic and political forces over which the veterinarian has practically no control. These forces will settle the matter one way or another in the course of time or from time to time. Meanwhile, the strategically sound position for the veterinarian to take is to avoid committing himself to the extension or curtailment of state medicine, and to make both private enterprise and state medicine as attractive as possible, thereby paving the way for a satisfactory status with a minimum of difficulty in adjustment to any condition that may develop in the future.

M. C. H.

TO THE LIFE OF DOCTOR BEMIS

By Dan W. Hurst

Loyal, kind and true,
Leaving unsaid the unkind word,
He searched, and worked for knowledge new.
He gained rich laurels, not by harm,
To those who longed for laurels too,
But by his work, ability and gracious charm.
In life we've known no nobler friend.
He added much to the world in which he lived.
We're grieved that he has met life's end.
His deeds live on, in those inspired,
By the greater things in life,
For which Doctor Bemis was admired.

GETTING THE BREAKS

In his latest book, "Rabbits for Food and Fur," Mr. Frank G. Ashbrook has included the following paragraph under "Treatment and Diseases:"

> The maintenance of sanitary conditions and the prevention of disease are functions of the rabbit breeder. The treatment of diseases, however, calls for the services of a competent veterinarian. Special training is required to diagnose diseases and to administer potent drugs, and as a rule the rabbit breeder is not equipped to do this sort of work.

Spratt's Patent Limited, of Newark, N. J., has published a pamphlet entitled, "Spratt's Hints on the Care and Feeding of Dogs." This is a revised edition of "Dog Culture" and contains some "notes on canine diseases and their treatment," which nowadays seem to be an indispensable adjunct to a publication of this kind. Without commenting on the value of these "notes," it is only fair to refer to the line appearing in bold-faced type at the bottom of every page, in this part (pp. 16-36 inc.) of the pamphlet, as follows: "Always Remember to Consult your Veterinarian if Possible."

The Ralston Purina Company, of Saint Louis, recently published a booklet entitled, "Purina Work Book—Horses and Mules." As an appendix is a table headed, "Common Ailments of Horses and Mules," with the names of eight common diseases, their symptoms and causes. The following note appears in boldface type at the end of the table:

> This information is given you to guide you in determining diseases among your work stock. For treatment of any of these diseases, our advice always is to consult a reputable veterinarian.

We appear to be getting a few of the breaks.

EXECUTIVE BOARD ELECTIONS

The primaries came to a close, in the Executive Board elections in progress in Districts 6 and 8, on April 28. It could hardly be said that the voting was heavy, as only a few over one hundred ballots were cast in District 6 and just a few more in District 8. In the former the votes were divided among 25 nominees, while 30 different names appeared in the ballots cast by members in District 8.

Dr. George H. Hart, of Davis, California, present incumbent in District 6, withdrew as a candidate for reëlection. As there was a tie for fifth place it was necessary to place six names on the ballot in this district. It is interesting to point out that there is one practitioner among the nominees in each of the districts.

There is also a B. A. I. veterinarian on each ticket. Also a state veterinarian. College veterinarians have been nominated in both districts, so we have the leading branches of the profession represented among the nominees in the two districts.

Of the eleven candidates, at least three have been among the nominees in previous elections. The majority, however, are making the run for the first time. Polls will close June 28. The successful candidates will take office at the close of the Kansas City meeting.

District 6

Curtis, W. L. — Los Angeles, Calif.

Practitioner. Graduate of Chicago Veterinary College, 1908, and New York-American Veterinary College, 1911. Joined A. V. M. A., 1923. Resident secretary for California, 1927-.

Hurt, Leslie M. — Los Angeles, Calif.

County Live Stock Inspector. Graduate of Iowa State College, 1904. Joined A. V. M. A., 1908. Chairman of Local Committee on Arrangements for Los Angeles Meeting, 1930.

Iverson, J. P. — Sacramento, Calif.

State Veterinarian of California. Graduate of San Francisco Veterinary College, 1906. Joined A. V. M. A., 1911.

Newsom, I. Ernest — Fort Collins, Colo.

Professor of Veterinary Pathology, Colorado Agricultural College. Graduate of Kansas City Veterinary College, 1909. Joined A. V. M. A., 1909. Resident secretary for Colorado, 1921-22 and 1926-; member of Committee on Revision of Anatomical Nomenclature, 1912-1920; member of Committee on Prevention of Transmissible Diseases of Animals, 1921-24.

Records, Edward — Reno, Nev.

Director of State Veterinary Control Service and Research Professor of Veterinary Science, University of Nevada. Graduate of University of Pennsylvania, 1909. Joined A. V. M. A., 1912. Resident secretary for Nevada, 1922-; member Committee on Necrology, 1923-24.

Schneider, F. L. — Albuquerque, N. Mex.

Inspector in charge, U. S. Bureau of Animal Industry. Graduate of Kansas City Veterinary College, 1905. Joined A. V. M. A., 1907.

District 8

Dykstra, R. R. — Manhattan, Kans.

Dean, Division of Veterinary Medicine, Kansas State Agricultural College. Graduate of Iowa State College, 1905. Joined A. V. M. A., 1912. Member of Committee on Necrology, 1919-1923; member of Committee on Resolutions, 1924-1926.

Jones, J. Leslie — Blackburn, Mo.

Practitioner. Graduate of Kansas City Veterinary College, 1913. Joined A. V. M. A., 1928.

KINSLEY, A. T. Kansas City, Mo.

Pathologist. Graduate of Kansas City Veterinary College, 1904. Joined A. V. M. A., 1904. Fourth vice-president, 1910-1911; president, 1921-1922; member-at-large of Executive Board, 1917-1921; member of Committee on Diseases, 1908-1909, 1910-1911, 1912-1913 and 1915-1916; member of Committee on Intelligence and Education, 1911-1912; member of Committee on Legislation, 1916-1917; member of Committee on Prevention of Transmissible Diseases of Animals, 1925-1926.

POTE, T. B. Saint Louis, Mo.

Inspector in charge, U. S. Bureau of Animal Industry. Graduate of McGill University, 1892. Joined A. V. M. A., 1928.

WILLIAMS, N. F. Fort Worth, Texas

State Veterinarian of Texas. Graduate of Kansas City Veterinary College, 1911. Joined A. V. M. A., 1917. Secretary of Section on Sanitary Science and Police, 1925-1927; member of Committee on Resolutions, 1926-1927; resident secretary for Texas, 1928-1930. Member of Executive Board, 1930-.

Some More Splendid Meetings

Our editorial in the April issue of the JOURNAL served as a stimulus, as a result of which we have received quite a number of reports of meetings held in various parts of the country during recent months. Read these over and see what your colleagues are doing in other states. We will mention just a few of the high spots of these reports.

Kansas veterinarians have undertaken to conduct a column on Live Stock Health in the *Kansas Farmer*. Veterinarians in northeastern Ohio have organized a local association, and veterinarians in southwestern Minnesota have done the same. The formation of a state association for New Mexico is announced, leaving only Idaho and Wyoming without state organizations. Almost three hundred veterinarians, from thirteen states, attended the sixth veterinary conference at the Ohio State University in March.

Three fine meetings were held at various points in Canada recently, by the Manitoba, Ontario and Central Canada associations. Much interesting information is to be found in these reports. Read them. We are told frequently that association secretaries get many valuable program hints from reading the reports published in the JOURNAL each month.

Who Wants Some Gelsemium?

An effort will be made to find a market for the roots of yellow jasmine (*Gelsemium sempervirens*) growing abundantly as a weed in the vicinity of Valdosta, Ga.

TWO VETERINARIANS AS MAYORS

The fact that veterinarians frequently have been elected to the office of mayor, in their respective cities and towns, does not in any way detract from the importance of such an event when it happens again. At the election held in Greenwood, South Carolina, on March 10, Dr. W. A. Barnette (O. S. U. '13) was elected mayor by a comfortable majority over two other candidates for the office. Dr. Barnette had previously served as a member of the City Council and as president of the local Chamber of Commerce, all of which mark him as a representative, public-spirited citizen, interested in the welfare of the community in which he lives.

DR. W. A. BARNETT

Dr. Barnette is secretary-treasurer of the South Carolina State Board of Veterinary Examiners and is a very active member of the South Carolina Association of Veterinarians and the Southern States Veterinary Medical Association.

DR. D. W. HURST

To be elected mayor of your city once is no small compliment, but what would you say of a veterinarian who had just been returned to that office for the third time? That is just what took place in Tecumseh, Nebraska, last fall, when Dr. Dan W. Hurst was elected mayor for the third time. He was similarly honored in 1921 and 1923. Dr. Hurst served as president of the Nebraska State Veterinary Medical Association, 1922-23, and this year he is A. V. M. A. resident secretary for Nebraska.

APPLICATIONS FOR MEMBERSHIP

(See January, 1931, JOURNAL)

FIRST LISTING

BARBER, CHARLES BROWN 125 S. 4th Ave., South Saint Paul, Minn.
D. V. M., Colorado Agricultural College, 1930
Vouchers: G. E. Totten and M. E. Schwab.

BROWNE, WILLIAM ARTHUR Cottonwood Falls, Kans.
D. V. M., Kansas State Agricultural College, 1928
Vouchers: Edwin J. Frick and Edward R. Frank.

BROWNLEE, HAL Sabetha, Kans.
D. V. S., Kansas City Veterinary College, 1910
Vouchers: Edwin J. Frick and Lawrence O. Mott.

BUTLER, CLAIR L. c/o A. S. P. C. A., 24th St. & Ave. A, New York, N. Y.
D. V. M., Kansas State Agricultural College, 1929
Vouchers: Raymond J. Garbutt and Orval L. Gates.

COX, ANDREW B. Rose Hill, Kans.
M. D. C., Chicago Veterinary College, 1903
Vouchers: Edwin J. Frick and Lawrence O. Mott

FARR, JESSE RUSSELL 838 Chafee Ave., Augusta, Ga.
D. V. M., University of Georgia, 1925
Vouchers: J. E. Lovejoy and A. G. G. Richardson.

HODGSON, HAROLD BISHOP 130 Hall St., Athens, Ga.
D. V. M., University of Georgia, 1921
Vouchers: A. G. G. Richardson and H. V. Persells.

HORCHER, CHAS. H. 1414 Queen City Ave., Tuscaloosa, Ala.
D. V. M., Ohio State University, 1915.
Vouchers: C. C. Middleton and Louis E. Beckham.

JUNGHERR, ERWIN Storrs Agr. Exp. Sta., Storrs, Conn.
D. V. M., Tierärztlichen Hochschule, Vienna, Austria, 1922
Vouchers: Hadleigh Marsh and J. J. Kavanek.

LYON, HEATH L. Hillsville, Va.
D. V. M., San Francisco Veterinary College, 1914
Vouchers: H. C. Givens and R. E. Brookbank.

MOCK, ISAAC TENNYSON Little River, Kans.
D. V. M., Kansas State Agricultural College, 1920
Vouchers: Edwin J. Frick and Edward R. Frank.

NELSON, SPENCER KINGSLEY Box 607, Albert Lea, Minn.
D. V. M., McKillip Veterinary College, 1917
Vouchers: B. C. Johnson and George M. Carson.

PFISTER, B. F. 4322 Main St., Kansas City, Mo.
D. V. M., Kansas State Agricultural College, 1921
Vouchers: Edwin J. Frick, Lawrence O. Mott and E. R. Steel.

PHALARES, GEORGE SPYRON Box 61, Chesaning, Mich.
D. V. M., Michigan State College, 1930
Vouchers: H. J. Stafseth and Ward Giltner.

PICHT, CLYDE W. 1307 E. 13th, Salt Lake City, Utah
D. V. M., Colorado Agricultural College, 1920
M. S., Colorado Agricultural College, 1924
Vouchers: E. P. Durham and D. J. Hickey.

SPAIN, ROBERT J. 1299 Grand Ave., Saint Paul, Minn.
D. V. M., Grand Rapids Veterinary College, 1918
Vouchers: G. E. Totten, Irvin Owens and M. E. Schwab.

STANLEY, NICHOLAS DAVID Hope, Kans.
D. V. M., St. Joseph Veterinary College, 1923
Vouchers: Edwin J. Frick and Lawrence O. Mott.

THEISS, EUGENE WARE 117 E. Lexington St., Independence, Mo.
D. V. M., Kansas State Agricultural College, 1930
Vouchers: Edwin J. Frick, T. J. Leasure and Hugh M. McConnell.

THOMPSON, JOHN B. 1137 Rowland Ave., Kansas City, Kans.
D. V. M., Kansas City Veterinary College, 1914
Vouchers: Joseph W. Parker and G. H. Randall.

Applications Pending

SECOND LISTING

Chapman, Raymond George, 2228-26 A St. W., Calgary, Alberta.
Cooper, Edwards Mercer, 205 Edmondston Road, East Hyattsville, Md.
Coppinger, David Wade, 930 Rice St. N. W., Atlanta, Ga.
Folse, Charles D., 70 Central Ave., Kansas City, Kans.
Hixson, Ralph Ward, Falls City, Nebr.
Jones, Albert Carl, High Point, N. C.
Lorton, Roy Duncan, Alvin, Texas.
Meyer, Alfred William, 150 W. 80th St., New York, N. Y.
San Miguel, Julio, Casilla 537, Santiago, Chile.
Sweebe, Edward Eldon, c/o Abbott Laboratories, North Chicago, Ill.
Williams, Clarence Virgil, 649 N. Robert St., Saint Paul, Minn.

The amount which should accompany an application filed this month is $8.33, which covers membership fee and dues to January 1, 1932, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

Connecticut Veterinary Medical Association. New Haven, Conn. May 6, 1931. Dr. Edwin Laitinen, Secretary, West Hartford, Conn.

New York City, Veterinary Medical Association of. Academy of Medicine, 5th Ave. and 103rd St., New York, N. Y. May 6, 1931. Dr. John E. Crawford, Secretary, 708 Beach 19th St., Far Rockaway, Long Island, N. Y.

San Diego-Imperial Veterinary Medical Association. San Diego, Calif. May 6, 1931. Dr. A. P. Immenschuh, Secretary, Santee, Calif.

Chicago Veterinary Medical Association. Atlantic Hotel, Chicago, Ill. May 12, 1931. Dr. C. L. Miller, Secretary, 508 S. Humphrey Ave., Oak Park, Ill.

Kansas City Association of Veterinarians. Baltimore Hotel, Kansas City, Mo. May 12, 1931. Dr. J. D. Ray, Secretary, 1103 E. 47th St., Kansas City, Mo.

Hudson Valley Veterinary Medical Society. Catskill, N. Y. May 13, 1931. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.

Southeastern Michigan Veterinary Medical Association. Detroit, Mich. May 13, 1931. Dr. H. Preston Hoskins, Secretary, 537 Book Bldg., Detroit, Mich.

Michigan-Ohio Veterinary Medical Association. Adrian, Mich. May 14, 1931. Dr. E. C. W. Schubel, Secretary, Blissfield, Mich.

Tulsa County Veterinary Association. Tulsa, Okla. May 14, 1931. Dr. J. M. Higgins, Secretary, 3305 E. 11th St., Tulsa, Okla.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. May 20, 1931. Dr. W. L. Curtis, Secretary, 1264 W. 2nd St., Los Angeles, Calif.

Keystone Veterinary Medical Association. Philadelphia, Pa. May 27, 1931. Dr. C. S. Rockwell, Secretary, 5225 Spruce St., Philadelphia, Pa.

Illinois State Veterinary Medical Association. Springfield, Ill. May 27-28, 1931. Dr. J. V. Lacroix, Secretary, 1817 Church St., Evanston, Ill.

Texas, State Veterinary Medical Association of, and Texas A. & M. College Short Course for Veterinarians. Texas A. & M. College, College Station, Texas. June 1-5, 1931. Dr. D. Pearce, Secretary, Box 335, Leonard, Texas.

Southeast Georgia Veterinary Association. Quitman, Ga. June 3, 1931. Dr. Hugh F. Arundel, Secretary, Box 68, Quitman, Ga.

American Association of Medical Milk Commissions, Inc. Adelphia Hotel, Philadelphia, Pa. June 8-9, 1931. Dr. Harris Moak, Secretary, 360 Park Place, Brooklyn, N. Y.

Oklahoma Veterinary Medical Association. Oklahoma A. & M. College, Stillwater, Okla. June 15-17, 1931. Dr. C. H. Fauks, Secretary, 1919 W. Ash St., Oklahoma City, Okla.

California State Veterinary Medical Association. Pasadena, Calif. June 16-18, 1931. Dr. W. L. Curtis, Secretary, 1264 W. 2nd St., Los Angeles, Calif.

Vermont Veterinary Medical Association. Hotel Vermont, Burlington, Vt. June 19-20, 1931. Dr. G. N. Welch, Secretary, 43 Union St., Northfield, Vt.

Michigan State Veterinary Medical Association. Lansing, Mich. June 23-24, 1931. Dr. E. K. Sales, Secretary, 535 Forest St., East Lansing, Mich.

North Carolina State Veterinary Medical Association. Winston-Salem, N. C. June 24-25, 1931. Dr. J. Howard Brown, Secretary, Rich Square, N. C.

Maryland State Veterinary Medical Association. College Park, Md. June 24-25, 1931. Dr. E. M. Pickens, Secretary, College Park, Md.

CANINE OBSTETRICS*

By HORACE A. GOULD, *Hollywood, Calif.*

Veterinary obstetrics is that branch of veterinary science which deals with the care, attention and oversight of the matron during the act of parturition, in domestic animals. It is one subject, like many others, which is of great scientific and economic importance and lies primarily at the very foundation of live stock husbandry. The many scientific factors contributory to the successful delivery of the new-born, at time of parturition and pertaining to its welfare immediately after same, embrace a complex of interesting phenomena which govern the ultimate success or failure of the entire live stock industry.

Successful parturition is depenednt upon and occurs only when the prospective mother is sound in the development of all her organs of reproduction and others directly related thereto. The fetus must undergo a normal development before it can be born to contribute its full share to the economic order of life. Therefore, the study of obstetrics must inevitably embrace a full knowledge of the factors which necessarily lead to parturition and those immediate sequelae of birth which are detrimental to the health of either the mother or her offspring. Truly a field too vast to cover adequately in any measure in a single paper or in the allotted time of twenty minutes.

In fact, when Dr. Schlotthauer asked for a paper on this subject, we were very hesitant in accepting the assignment, realizing only too well the scope it involved and remembering too vividly the many difficulties we have encountered in the past and cognizant of the problems which confront us daily in the practice of canine obstetrics. It will be necessary then to touch but lightly upon many of the subjects which must perforce enter into a discussion of this kind, and confine our remarks chiefly to phenomena which concern the canine practitioner.

OBSTETRIC ANATOMY

The pelvis is highly important in the carrying out of reproduction, inasmuch as the attachment of the vulva to the pelvis constitutes the fixed base of support for the vagina, uterus, oviducts and ovaries. It is this attachment which enables the walls of the uterus and vagina to contract effectively on the fetus

*Presented at the sixty-seventh annual meeting of the American Veterinary Medical Association, Los Angeles, Calif., August 26-29, 1930.

and propel it toward the vulva at time of parturition. Then, too, since the fetus must pass through the pelvic canal at time of parturition, the success of the birth act is dependent in part on the amplitude of the pelvic canal in comparison with the dimensions of the fetus.

The internal face of the pelvic walls is of most importance, and into its cavity extends the posterior prolongation of the peritoneum. In the non-pregnant female the pelvic cavity contains the rectum, vagina and uterus, and in ruminants, the oviducts and ovaries. The pelvis is composed of the sacrum and coxae, with their ligaments. The first two or three coccygeal vertebrae contribute to the formation of the pelvic roof.

Each coxa is composed of an ilium, ischium and pubis, and by their anchylosis at the ilio-pubic symphysis they become a continuous structure. The sacro-sciatic ligament arises from the transverse spinous ridge of the sacrum, passes downwards and is attached to the supero-external border of the ilium and ischium, from the sacro-iliac articulation, backward to the ischial tuberosity. The two ligaments thus consist of wide aponeurotic sheets which form a greater portion of the lateral pelvic walls. This broad and powerful ligament furnishes attachment for the vulva and several powerful muscles, has a tendency to prevent the posterior portion of the pelvis from receding downwards from the sacrum, and forms a strong and somewhat flexible and yielding wall to the pelvic cavity. Under the pressure of parturition it yields enough to permit the constricted outlet to equal in dimensions the larger bony inlet of the pelvis. The powerful prepubic tendon arises from the pubic brim and, through the linea alba and contributory muscles, finds attachment to the ensiform cartilage of the sternum.

Generative Organs

The generative organs of the mammalian female consist of the ovaries, oviducts, uterus, cervix, vagina and vulva. The ovary of the bitch lies closely applied to the sublumbar region, immediately behind the kidney, virtually at its point of origin. In the bitch the oviduct is hidden in the fat of the broad ligament. The utero-ovarian ligament of the dog and cat is very short, so that the anterior end of the uterine cornu is virtually in contact with the ovary, while the oviduct three to four inches in length is thrown into numerous folds to terminate in the immediate region of its origin. In the uterus, the relative sizes between

cornua and uterine body bear a close relation to the number of young brought forth at a given birth. In the bitch the two horns are extensive, while the body of the uterus is relatively unimportant. This is the case with most all multiparous animals.

The cervix or neck of the uterus consists of a powerful sphincter-like segment of the genital tract, serving to separate the uterus from the vagina. When parturition takes place, the cervix as such becomes practically obliterated, and the canal dilates sufficiently to allow the passage of the fetus, that is, until the passage becomes co-extensive with the pelvic cavity and those of the uterus and vagina.

The vagina is a musculo-membranous canal formed from the fusion of the posterior ends of Mueller's ducts and extending from the cervix to the vulva. It begins at the os uteri externum and ends posteriorly at the position of the hymen, just anterior to the meatus urinarius, where the vulva succeeds it.

The vulva, located immediately beneath the anus, constitutes the posterior termination of the genital canal. It arises from the ectoderm of the embryo.

Physiology

Since the specific function of the reproductive organs is the procreation of the species, we will review briefly the phenomena transpiring toward that accomplishment. In the bitch, sometime between the seventh and twelfth months, usually at about nine, estrum or heat takes place. It is at this time that the female, unless closely confined, leaves home, usually for a period of days. It is this period of wanderlust, and its resultant gatherings of the canine species, which has a very important bearing on the spread of infectious diseases, with many of which we come in contact daily, in our practice.

During estrum, ovulation is also occurring and the distended ovisac ruptures as a result of intrafollicular pressure. In multipara it is assumed that there are at least as many ova discharged from as many ovisacs as there are embryos formed. When physiologically normal, estrum and ovulation are inhibited by pregnancy, but occasionally abnormalities occur and we see both occurring while the animal is pregnant and the fetus alive and well.

Embryology

Fertilization, fecundation or conception follows copulation if all is normal and well in both the male and female. Fertilization

having taken place, we will follow the fertilized egg through some of its phases until the time the fetus is ready for delivery. Embryology embraces the normal development of the fertilized egg; teratology embraces the aberrant or disorderly development of the fertilized egg.

Segmentation of the egg: Immediately after the ovum has become fertilized by the spermatozoon, the resulting cell undergoes a progressive division by the process of mitosis or karyokinesis, which is termed segmentation. This process of cell cleavage continues until the blastodermic vesicle is formed. During this stage of development, which continues in the rabbit until the seventh day, the ovum lies free within the uterine cavity. In multiparous animals the ova, which enter the uterus almost simultaneously, tend to become distributed at more or less uniform intervals throughout the horn of the uterus, and assume the positions which they are to maintain during intra-uterine life. The location of each embryo is indicated early by the bulging of the uterine walls.

Toward the close of the development of the blastoderm, important changes take place, by which there are developed three distinct germinal layers, each of which takes a special part in the formation of certain tissues of the embryo. They are: the external layer of epithelial cells, the ectoderm, a middle layer or mesoderm, consisting of cuboidal cells, and an inner layer of epithelial cells, the entoderm. Phenomena in cell cleavage go on until finally, from the ectoderm, arise the epidermis, hair, nails, hoof, horns, and the cerebro-spinal nervous system.

From the mesoderm of the somatopleure arise the striped or voluntary muscles, bones, connective tissue, and other skeletal tissues and the deeper layers of the skin. The mesoderm of the splanchnopleure gives origin to the heart and circulatory system and to the muscular portions of the digestive, respiratory, and urino-genital organs and in a general way to the pale or unstriped muscular fibers. The entoderm of the splanchnopleure forms the epithelium of the digestive and respiratory tracts. The neural groove of the blastoderm marks the beginning, location and form of the future cerebro-spinal nervous system.

Fetal Membranes

Time does not permit us to give more of the results of cell cleavage as it pertains to the origin of all the body structures, so

let us consider briefly the ways and means for maintenance and development of intra-uterine life of the fetus.

The embryo must be fixed at a given point in the uterus, where its position can be maintained throughout the duration of pregnancy, in such a manner as best to protect and insure its life and normal growth. Nature has provided for this by forming three structures from the blastodermic vesicle, which undergo changes to constitute finally the fetal membranes and the placenta.

When the embryo commences to develop, the embryonic area folds downward and inward at its borders, and forms what is called the vitelline sac. The amnion commences to form soon after segmentation has been completed and the ovum, after passing through the oviduct, has reached the uterus. The formation of the amnion is usually complete at about the fourteenth day. It forms a double membrane, which grows upward and finally fuses at the top. This envelops the fetus completely except at the bottom, where it takes part in the formation of the umbilicus. The inner of these two membranes forms the true amnion; the external one forms the external or false amnion or primitive chorion. Between the amnion and the fetus is the amniotic cavity, filled with amniotic fluid. The amount of liquor amnii is, in most animals, greatest in quantity at about the middle of gestation.

The allantois arises as an evagination from the hind gut and grows outward and backward between the amnion and the primitive chorion as two separate layers. In the mare and carnivora the allantoic sac finally envelops the amniotic sac so that in these animals there occur two hollow fetal envelopes. Collectively these membranes, with the addition of the remains of the vitelline sac, constitute the fetal membranes or afterbirth. The external or vascular layer of the allantois, with vestiges of the false amnion, constitutes the permanent or allantoic chorion.

The Placenta

The placentae are those portions of the fetal membranes or annexes, and of the uterus, which serve to bring about an intimate contact between the circulatory systems of the mother and the fetus. When the amnion develops, the external or false amnion is but a continuation of the early wall of the yolk-sac, which completely invests the embryo. Over the entire surface of this embryonic sac, villi grow out to establish relation between the

embryo and uterus. The blood-vessels of the fetus and those of the mother do not become continuous, but are constantly separated by the endothelial layers of both the maternal and the fetal capillaries.

The capillaries of the allantois become greatly branched and grow out as villi and, attaching to the mucous membrane of the uterus, come in contact with corresponding groups of capillaries of uterine walls and through the thin walls of this capillary network there is a free interchange of nutritive and waste products, but not of cellular elements. The separation of the fetal from the maternal circulation is so complete that ordinary disease micro-organisms do not pass through, and consequently where the mother is infected with a contagious disease the fetus does not usually contract it through the blood-stream. In carnivora the placentae are zonular. The chorionic villi are restricted to the zone of the chorion encircling the embryonic sac in contact with the uterine walls.

The Umbilical Cord

The umbilical cord serves as a means of communication between the embryo and the placenta. It is formed by the allantoic stalk, surrounded by the amnion, and includes the vestiges of the vitelline duct. In carnivora it is divided into the am nniotic and allantoic portions. A cross section of the cord includes the amnion, serving as a thin, dense investing membrane; the two umbilical arteries and the pair of veins sometimes fused to form a single vessel; the urachus and the vestiges of the vitelline duct. Around these vessels is found Wharton's jelly embedded in a network of delicate connective tissue. In carnivora the cord is short, very resistant and is usually bitten off by the mother.

Pregnancy

Pregnancy or gestation is that period during which the young is undergoing development in the uterus of the mother, a period extending from the time of fertilization of the ovum to parturition; in the canine species, usually a period of about 63 days. In the bitch and cat the uterine cornua become enlarged and bulged at the points where the impregnated ova have lodged. This arrangement results in a nodular form. These nodes are usually quite evenly distributed throughout the entire length of the tube. During pregnancy the muscle fibers of the uterus become increased in number and size, as are also the broad ligaments of the uterus increased in length and thickness.

The cervix undergoes a marked change during pregnancy. The cervical canal is firmly closed by the constriction of the circular muscle fibers of its walls and the occlusion is made even more complete by a gelatinous seal, which is very thick and firm. As parturition approaches, the os uteri becomes somewhat dilated and the uterine seal enlarged in similar degree, insuring the continuance of the sealing of the canal until parturition takes place. As this approaches, the walls of the cervix become softer and more distensible and the longitudinal folds of mucous membrane begin to disappear. Finally, when parturition takes place, the cervical canal becomes dilated to the same dimensions as the vagina and uterus.

Diagnosis of pregnancy in the bitch is not always possible until the fourth or fifth week, although frequently soon after fertilization one may notice a settling down in the disposition of the female. Sometimes there is nausea earlier than the fourth or fifth week. Inasmuch as the bitch comes in season normally only every five or six months, one cannot look for the cessation of estrum early in pregnancy as a guide to diagnosis of pregnancy, as in the larger animals, which come in season more frequently. The examination per rectum and per vaginam in the bitch is not so practical in determining the presence and duration of pregnancy, as in the large animals. The Abderhalden test is a laboratory blood test for pregnancy, seldom resorted to, as far as our experience is concerned, in the average practice.

Anomalies in Fecundation

Superfecundation is the fertilization of two or more ova, one after the other, during one estrual period. When two or more ova are liberated during one estrual period, one or more may be fertilized as the result of one copulation and another or others as a result of another copulation. If two or more copulations are made by the same male, the evidence of fecundation is wanting. But when two different males of different breed, type or species copulate with the female, the evidence of superfecundation is marked. Superfecundation is most commonly met with in mongrel female dogs which are neglected and roam the streets, and are frequently mated with two or more males of different breeding. Here the evidence of superfecundation is frequently marked.

Superfetation differs from superfecundation in that a second ovulation occurs in an animal already pregnant and the second

ovum is fertilized by a second copulation. For this to occur, there must be a departure from the rule of pregnancy inhibiting ovulation and estrum. There are cases on record of this occurring in a goat and a sow, but we have never seen this occur in the canine or any other species.

Wandering or genital cells: Schmalz claims that the spermatozoa may pass through one of the oviducts into the peritoneal cavity, and cross over to the opposite ovary. It is also claimed that rarely an ovum escaping from one ovary, but failing to enter the corresponding oviduct, has passed across to the other ovary and entered its oviduct. It has been alleged that an egg which has been liberated from one ovary has been fertilized and passed through its corresponding oviduct and cornu to the body of the uterus, thence upward into the opposite cornu, where it becomes attached and develops into an embryo.

Polyspermia: Some authorities claim that an egg may be fertilized by more than one spermatozoon and should this be the case, would undoubtedly terminate in a double or triple monstrosity.

Parturition Diseases

Under this heading we will touch but lightly upon the abnormalities which can and sometimes do exist relative to pregnancy, inasmuch as Dr. Jones has already given you a review of this subject. Most of these mentioned are seldom met with by the canine obstetrist. The first, osteomalacia, has been reported by European writers to be commonly found in pregnant domesticated animals.

Dropsy of the uterine walls and dropsy of the utero-chorionic space are seldom seen. Paraplegia is a condition which we sometimes find, possibly more in some of the breeds of bull dogs than in other breeds. Rupture of the prepubian tendon is seldom seen in the bitch.

Hernia of the uterus or hysterocele is seldom experienced, but in case of umbilical hernia previous to pregnancy, if the ring is quite large, it is liable to uterine hernia and one or more of the fetuses may develop in the hernial sac.

Rupture of the gravid uterus is not common in the dog, but might occur through traumatism or other causes, a condition, wherever found, that is grave indeed.

Extra-uterine pregnancy is the existence of an embryo or fetus in the abdomen outside the uterine cavity, the several forms being

ovarian and tubal pregnancy, the latter sometimes being found in domesticated animals; rupture of the gravid uterus, allowing one fetus or more to pass outside the uterine cavity, and fourth, a primary abdominal impregnation may take place and the fetus become attached to the abdominal wall.

Torsion of the uterus results from a revolving of the organ upon its long axis. This is seldom seen in the canine but more often in uniparous animals, especially ruminants. Prolapse of the vagina and cervix are seldom met with in the canine.

Primary Diseases of the Fetus and Its Membranes

Hydrops amnii, or dropsy of the amnion, is an excess amount of amniotic and allantoic fluid and has been observed in the bitch as well as being more commonly found in the mare and cow. Inertia of the walls of the uterus results, as they have no power of expelling the fetus. The excess weight causes the animal to lie down most of the time. The prognosis is grave for both mother and offspring.

Fetal anasarca is seldom seen in the bitch or other domestic animals. It consists of a general edema of the entire body, so that the bulk of the fetus is greatly increased. The fetus has the appearance of a rounded mass with its tissues infiltrated everywhere with fluid.

Symptoms of Parturition

In the bitch, along about the fourth or fifth week after fertilization, pregnancy becomes noticeable. It is then that we notice a slight enlargement or puffing out of the abdomen. At the same time or soon after we can also note an enlargement of the mammae. The prospective mother becomes more or less phlegmatic in disposition and is less inclined to move about as the time of parturition draws near. If she is a young bitch and if it is her first pregnancy, she becomes nervous and uneasy as early as 24 hours sometimes before she starts whelping, wandering around in quest of a nest and, if confined, begging to be let out. If released she is apt to hide out until time of parturition when she frequently becomes panicky and is apt to have her whelps in as many places as she has pups, literally dropping them all over the premises.

Therefore, it is necessary to watch young females more closely than old ones at this time. When the matron has become experienced, she is less excitable and may not show the usual symptoms of restlessness, panting and licking of the genitals,

premonitions of parturition, until thirty minutes before that happens. In the older female the mammae do not usually start swelling so early in pregnancy as in the young female.

Physiologic Presentations and Positions of the Fetus

In order that normal birth may occur, it is necessary that the fetus approach the birth canal in such a position as to make its passage practicable. There are various dispositions of the fetal body which make its advent through the birth canal possible, and others which make it practically impossible. In handling obstetrics we recognize three fundamental elements in reference to the attitude of the fetus, viz., the presentation and position of the fetal body and the arrangement of its extremities.

Presentation, expressed mechanically, is the relation existing between the spinal axes of the mother and fetus. The term indicates that portion or general region of the fetus which is offered at the pelvic inlet at time of parturition. It is not only essential that the long axis of the fetus be parallel to that of the mother at time of parturition, but the transverse axis of the chest of the fetus must be temporarily reduced. The fact that the spinal axes of the fetus and mother lie parallel does not necessarily mean parturition without aid. The fetus may enter the birth canal by either the cephalic (anterior presentation) or caudal end (posterior presentation).

In multipara, the fetuses largely lie alternated, and that rather promiscuously. Transverse presentations, whether dorsal or ventral, are pathologic. Here the fetus lies horizontally and upon its side with the cephalic end in either the right or left flank of the mother. It is very rare that transverse or bi-cornual pregnancy exists in the bitch.

The normal and abnormal presentations and positions are given as follows, according to Williams:

Presentations: the longitudinal embrace the cephalic and caudal; with the positions of dorso-sacral, dorso-pubic, right dorso-ilial, and left dorso-ilial. If presented transversely, we have the dorsal and ventral presentation with the right and left cephalo-ilial positions.

Dystokia

While physiologic birth is accompanied by pain and severe straining on the part of the mother, yet the act is safe for both mother and offspring. It is when birth is difficult or impossible without artificial aid that we term it dystokia or difficult labor.

Dystokia may be divided into two classes; maternal and fetal. Maternal dystokia is dependent upon some defect, disease or displacement of the maternal organs. Or there may be some disease of an adjacent organ which obstructs the genital passage or some systemic disease may interrupt the normal expulsion of the fetus. Fetal dystokia is due to some primary disease of the fetus or to some abnormality in its size, form, presentation or position.

Equipment for Obstetrical Work

The canine obstetrist has an advantage over the large-animal obstetrist, for as compared to the large array of heavy and cumbersome tackles, repellers, saws, hooks, ropes, chains, etc., necessary in large-animal work, the equipment required in small-animal work is comparatively simple, light and quickly accessible.

For the average obstetrical case not requiring cesarean section, we would set out the pituitrin, hypodermic syringe, lubricant, either mineral oil or lubricating jelly, a one- or two-ounce dose-syringe for injection of lubricant per vaginam if fetus is lodged or dry, the favorite obstetrical forceps or maybe two pairs, blunt hook with crotchet, a few strings, antiseptic solutions, cotton, sterile gauze, aromatic spirits of ammonia, and camphosol or camphorated oil for emergency stimulation if needed, and with proper sterilization of instruments, hands and field we could go to work.

Many practitioners claim they deliver more puppies with the blunt hook than any other way. Others use their favorite forceps almost entirely and seldom the hook, while others, in difficult cases, depend on snaring the feet with strings and using them when needed. Others use a wire snare through a small tube. Personally we feel that the hook is very useful at times but do not like to tear live puppies with it unless they are to be later destroyed. We feel that if the operator will not be too much in a hurry and allow the female more time to get the puppy up to the pelvic opening, many pups would be saved lacerations, and more live puppies would result.

Personally we like Dr. C. A. White's forceps for live and dead puppies and also the Quitman forceps. We resort to the hook at times and occasionally the strings allow us to get the foot we want and keep it from doubling back and preventing egress of the fetus where otherwise it would when there is a tight squeeze. Too frequently the canine obstetrist is inclined to try and get all the puppies without giving the mother a rest and allowing the con-

tractions of the uterus to bring the puppy up far enough to get at it intelligently. This requires patience on the part of the operator and fortitude and faith on the part of the owner in the attending veterinarian.

Oftentimes we are prompted not to use our best judgment and wait, due to too frequent inquiries over the phone from the owner, imploring us to hurry and get the puppies away or the mother will die. If we take the proper time for the ordeal and the matron does die, why, I told you so. If we allow ample time for nature to reënforce the ebbing strength of the one in labor, by not rushing matters too much, we will, in the majority of cases, save many more puppies and whelping mothers than we will lose.

If there were one single point we would wish to emphasize to any one starting out as a canine obstetrist, it would be to take a rational and proper amount of time in delivering the litter. Do not forget that you do not have to do it all. Relieve the dystokia if it is present, and by so doing you assist nature; but do not forget that nature will also assist you—if you wait a little and give her a chance.

After getting a difficult puppy and you have worked perhaps for 30 minutes or longer, the bitch is pretty well tired out and needs rest and your nerves are slightly frayed and patience lacking. Put her away for a half-hour or longer until contractions of the uterus have brought another puppy where you can get at it, and until both patient and doctor are ready for the next ordeal. Do not forget that a little lubrication between puppies aids materially in successful delivery and helps prevent tearing the vagina and vulva. I think perhaps more injury is done the mother and the cause in general by the blind fishing for puppies with hooks and forceps than in any other way. It is in so doing that the membranes of the uterus are snagged or torn, with resultant hemorrhage and infection and usually death, not only to the mother but offspring as well.

In cases where the puppies are dead and perhaps decomposed, so that it is necessary to remove them piece by piece, the greatest danger occurs in grasping a fold of the uterus instead of parts of a mangled puppy. In these cases there is usually inertia of the uterus and a low state of vitality of the mother. After delivering such a puppy it is well to irrigate the uterus with antiseptic solution such as neutral acriflavine, having the solution quite warm, and this will not only flush out the loose decomposed material but help to establish circulation in the uterus and aid

its tonicity and contractile powers. This also aids in separating the placenta from the uterine walls and allowing the fetus to slip forward a little where it will be more readily accessible.

After all there are no two obstetrical cases identically alike and it rests with the ability, intelligence and ingenuity of the operator to surmount the various obstacles to delivery, as they arise. There is no hard and fast rule to anything in obstetrics. It is largely up to you and your generalship to win the battle of life for your patient and her offspring. Oftentimes, after starting to deliver the litter per vaginam, we find that further effort is useless or fraught with greater danger of fatality than by resorting to gastro-hysterotomy or cesarean section. So, if our generalship dictates that procedure as our next move, why let's go ahead with it.

Gastro-Hysterotomy or Cesarean Section

Here of course we must remove the fetus or fetuses from the uterus, by an incision through the abdominal and uterine walls. Before starting proceedings it is well to rid the bowel of fecal matter with an enema. It is at the discretion of the operator whether he wishes then to use morphin or H. M. C. hypodermically before and preparatory to anesthetizing the patient.

After the animal is anesthetized, it is well to lay her on her back and gently but firmly apply pressure over the bladder to relieve it of what urine is present. Then lay the animal on the left side and clip and shave the hair off of the right flank, including the area between the external angle of the ilium and the last rib, down to the mammae. Next, thoroughly antisepticize the field, tincture of iodin probably being as effective as any other skin antiseptic. Your instruments having been thoroughly sterilized by boiling, you now select your sharp-pointed bistoury and start making your incision a little below the external angle of the ilium, and midway between it and the last rib and extend downward, almost perpendicularly.

After making your incision through the skin, it is well to use another sharp-pointed bistoury in continuing through the muscles and peritoneum. From your sterilizer now take your sterilized gauze or towel and lay it around and below the incision. Now, by gentle manipulation, work the nearest cornu out through the opening and lay it on sterilized dressing. In the centre of its greatest curvature and parallel with its long axis, make an incision long enough through which to remove the fetus, without tearing the ends of your incision. Immediately below your in-

cision, your assistant is holding tray or receptacle to receive the fluids which immediately escape, and of course due care must be exercised not to allow any of the fluid to escape into the peritoneal cavity.

The incision is made as near to the body of the uterus as possible, to permit of removing the puppies in each horn through the same opening. Occasionally this is impossible and an incision must be made in each horn. It is well to remove the membranes with the fetus, if possible, where the puppies are dead, as this lessens the possibility of contamination of the wound and resultant infection. If puppies are alive, it is well to cut through the membranes and liberate them as soon as possible. If pups are alive or possible of saving, the assistant should start work on them as soon as delivered with the usual methods of resuscitation.

After all the puppies have been removed, the membranes or vestiges of same are removed and the uterine cavity swabbed out with gauze dipped in the proper antiseptic solution, probably neutral acriflavine. The uterus is then stitched with sterile catgut, some using the Czerny-Lembert suture, the sub-cuticular or Halsted's mattress suture. After suturing the uterine horn or horns, they are replaced in the peritoneal cavity and the abdominal wound is sutured with the figure-8 suture, using silkworm gut and suturing peritoneum, muscles and skin in one operation, or peritoneum and muscles may be sutured together with catgut and the skin with silk or linen. An antiseptic pack and bandage should be placed over the wound after same has been painted with tincture of iodin or mercurochrome.

The mother should be placed by herself until fully out from under the anesthetic and the puppies not allowed to nurse until she is rational. Often it is necessary to secure a foster mother for the offspring. If all goes well, the sutures may be removed from the wound in from five to seven days. Some operators like a collodion and cotton bandage over the abdominal incision, which does not cover the udder and interfere with the puppies nursing.

Time does not suffice to discuss the vicissitudes of life awaiting the new-born. Our time is more than up so we will stop here, so in the parlance of the young boy, "That's all they is, there ain't no more." Thanking you all for your kind indulgence in bearing with us this long, when so much of interest is awaiting you and wishing to mention that much of the technical matter presented in this paper was obtained through consulting the reference work

of Prof. W. L. Williams, in his book entitled "Veterinary Obstetrics," we wish you all much joy during the balance of your stay with us in this, the one and only, sunny southern California.

DISCUSSION

DR. W. L. CURTIS: In case of a Boston getting ready to whelp, and one foot presented through the vagina, how do you determine whether it is a back or front foot, and if it proved to be a front foot, how would you proceed?

DR. GOULD: That is a question for each man to solve in his own way. It is pretty hard, I will admit, where you have one foot presented, and if you can barely touch the foot. Of course, if you can feel up as far as the hock, you can determine whether it is a hind or front foot. Then you know your presentation and, taking everything into consideration, you are at liberty to go ahead with your cesarean operation, if you feel your condition is such that you are going to lose time, and probably the bitch, or puppies, by trying to get them through the vagina.

DR. J. J. HOGARTY: Dr. Gould mentioned giving the bitch plenty of time. In the case of a valuable animal do you think it is good practice to fool around so long or would it be better to recommend a cesarean operation immediately?

DR. GOULD: It depends on the time that she has been in labor. I do not want to be misunderstood as meaning that a person should wait an indefinite amount of time, but the one point I wished to make was this: I think a great deal of damage can be done by overworking the bitch, if she has had one puppy, in trying to get them all at one time. If it is a valuable bitch, and the uterus has no contractions at all, and you feel that something must be done right now, and she has been laboring long enough, undoubtedly the thing to do is to perform a cesarean operation right away. You cannot afford to wait too long and if there is an inertia of the uterus you have to remove the puppies.

DR. CURTIS: If a foot is presenting itself, and the question is how you are going to determine whether it is a front or back foot, my answer is this: Practically all Bostons have five toes on the front feet and four on the back feet. If a foot can be secured on a piece of string, you can usually pull the foot out far enough to count the toes; if it has five toes it is a front foot and if it has four toes it is a back foot. Now the question is how to get the pup out. We eliminate the possibility of doing the cesarean and there are two ways to bring that pup out. If the front foot is presented, the head is turned back, and in most all small dogs, with only one pup in the uterus, it is possible to shove the shoulder back in the uterus and turn the head in the vagina. If that can be done the pup can be pulled out by the head. If that is impossible, I hook the pup through the shoulder with a long hook.

DR. GOULD: I would like to hear from anybody regarding his opinion of pituitrin and what has been his experience.

DR. G. M. SIMMONS: I think that pituitrin is a very valuable agent in our hands if it is used properly at the proper time. In inertia of the uterus, where the puppies are alive, there is no apparent danger of rupturing the uterus through the use of it. I believe that 2 cc of pituitrin would help bring the puppy up to the pelvis where we can reach it with our fingers and, in the majority of cases, deliver a normal puppy and the rest of them would ordinarily follow. That has been my experience.

DR. T. I. MEANS: Is there any reason or excuse for what I term false pregnancy, that is, where the abdomen is distended, the mammary glands enlarge, and the bitch goes through all the nervous, and other indications of pregnancy, and yet there is no pregnancy? Is there a reason for that or is it just one of those conditions that happen once in a while?

DR. GOULD: I think that is something we have all experienced. I do not know why that should happen. It does happen and certainly fools all of us at times. Why it should happen, whether it is a sympathetic nervous condition, I don't know. But there is no pregnancy there many times and yet the mammary glands enlarge and it certainly looks as though pregnancy did exist.

DR. J. C. FLYNN: We know that propagation is due to the act of the male and female, and that, in the absence of the male, the female makes her effort

to propagate; she makes her own effort, as far as she can go, which we see very commonly in bitches that have never been mated. They will come in season and, about sixty-three days thereafter they will form milk in the breasts, the abdomen will be enlarged, the vulva will be enlarged, and to every appearance the bitch is going to whelp. That is nature's half effort to complete the act of propagation. I think there isn't anything particularly mysterious about it.

DR. HOGARTY: I would like to ask a question in regard to mammary tumors, where they become glandular and almost cancerous, in bitches. I would like to ask if anyone in the room has ever experienced one of those cases in a bitch that had been spayed?

DR. CURTIS: I have.

DR. HOGARTY: I would like to ask Dr. Curtis how many live pups he gets, we will say, from a Boston.

DR. CURTIS: I have pulled a great many live pups out.

About two years ago I had a Boston, approximately twelve years old, that had tumors of the mammary glands. I had spayed the dog myself so I think she was spayed all right. These tumors were malignant. I took out one, we will say in May, another one in June, and by the time the third was taken out it was July or August. I thought I had better destroy the dog because the tumors were forming faster than I could remove them. That is the only one that I recall.

DR. HOGARTY: One more question. Dr. Gould mentioned copulation, a number of copulations. Do you think it is necessary to have more than one?

DR. GOULD: No I don't. I think that if the male and female are normal, one copulation is all that is necessary. If not, a dozen won't do any good. I mentioned that in regard to superfecundation and superfetation as more of a fact. For instance, bitches that are running loose are mated more than once and lots of times that accounts for the differences between puppies in the litter, which many people do not quite understand.

DR. HOGARTY: So many recommend two and three breedings. I think it is entirely unnecessary. I had a dog shipped from Canada and bred her to an Irish Setter once and got thirteen pups.

DR. GOULD: I think that if the male and female are normal, one copulation is as good as a half-dozen; yet many breeders give a second service the second day, but my experience is that any bitch that I ever owned, when mated twice, usually whelped from the first service.

DR. HOGARTY: In performing a cesarean in the normal bitch, do you think it is necessary to stitch the uterus?

DR. GOULD: Well, I would think it would be necessary. What is your opinion?

DR. HOGARTY: The fluid that escapes is usually sterile?

DR. GOULD: Supposed to be.

DR. FLYNN: I don't quite get Dr. Hogarty's idea there. It would appear to me that it would be just as essential to close that uterus as it would be to use all of your antiseptic gauze and packs to keep the fluid from the uterus getting into the cavity.

While I am on that subject—and I have no criticism of the essayist at all—I want to say that I have just a little different method that I pursue. After I have made my opening through into the peritoneal cavity I have frequently gone no further, as far as making incisions is concerned, but manipulate the fetus by working it around, changing its position, and insert the forceps through the vulva and place them on the fetus, without opening the uterus, and remove the pup in that way. You do not cut open the uterus; and don't allow any fluid to escape. If you can do it that way I think it is more practicable and safer than by opening the uterus.

Another method that I pursue is in making the incision in the uterus, to remove the fetus. I go on the dorsal side, just back of the bifurcation and I work the fetus up and, if there are two or three, try to work them out through the same opening. The advantage is that you are making only one incision and you have it on the dorsal surface of the uterus where, if there is any drainage, it is going to follow the natural channel, instead of working out through the incision if it is not properly closed.

Those are two things that I have practiced in obstetrical cases and I believe there is quite an advantage to them.

DR. GOULD: Those are two good points. However, I think there are times when you have to make two incisions. If your fetus is dead, it is often times difficult to manipulate it, around to one opening, and then you have to make two incisions.

DR. A. A. HERMANN: It is my opinion that if one were choosing between a cesarean and instrumentation, the client usually will prefer a cesarean and is glad to pay the additional fee. It brands the man as an expert operator, where his competitor, who is not a veterinarian, might use instruments with as much apparent skill as he would use.

All of our cesareans are performed on the median line, because we find that it does not interfere with the nursing of the pups. We seldom use a foster mother.

If we find decomposed fetuses, we put a rubber drain into the abdominal incision and drain away the fluids. If we have every reason to believe the fluids are sterile, we see no objection to their pouring into the abdominal cavity, as our thoughts are directed to a quick operation rather than a lot of time spent in swabbing up and drying up and attempting to restrain or check the normal fetal fluids from getting into the abdominal cavity, because where the temperature is normal the individual has not been tampered with, there seem to be no bad effects whatever from letting any quantity of that flow into the abdominal cavity.

We believe in suturing the uterus so that if infection should gain entrance through the vagina it will not gravitate into the abdominal cavity. We believe that a big percentage of bad results following cesarean operations are not due to carelessness or lack of sterilization on the part of the operator, but rather—and this is substantiated by carefully questioning the owner of the dog—to some examination made by the owner or some other operator, through the vagina, to determine the position of the fetus, which appears to be an innocent examination, but carried on with a bare hand, rather than a gloved hand, carries infection to the vagina and into the uterus, there to be spread and permitted to spread through the abdominal incision throughout the body. In fact, the big percentage of fatalities follow a vaginal exploration. It is just as easy, and much safer to the matron, to make all such examinations through the rectum. One can tell practically as much regarding the position of the head of the fetus through the rectum as could be determined through a vaginal examination.

DR. C. W. BOWER: I believe, in explanation of the question asked by Dr. Hogarty, that he was referring to the work done at Pennsylvania by Dr. W. J. Lentz. Dr. Lentz, with all sincerity, does the operation without suturing the uterus. Of course, that is where there is no intra-uterine infection, or swollen fetuses, and he says it does no harm to let the fluid out into the abdominal cavity, if sterile; and he also further states that healing is quicker and with less pain, and there are fewer adhesions, and he has performed the operation and advises it on his picked subjects, of course, both canine and feline.

BUREAU TRANSFERS

Dr. J. W. Harner (K. S. A. C. '09) from Canaan, Vt., to Evansville, Ind., on meat inspection.

Dr. Harvey E. Smith (Colo. '18) from Oklahoma City, Okla., to Omaha, Nebr., on meat inspection.

Dr. James E. Ewers (K. C. V. C. '10) from Fort Worth, Texas, to Albuquerque, New Mexico, on tuberculosis eradication.

Dr. S. O. Benson (A. P. I. '25) from Brooklyn, N. Y., to Houston, Texas, on meat inspection.

Dr. Henry Tornow (K. C. V. C. '09) from Wichita, Kans., to Denver, Colo., on virus-serum control.

THE USE OF NICOTIN AND ITS COMPOUNDS FOR THE CONTROL OF POULTRY PARASITES*

By CLIFF D. CARPENTER

Petaluma Laboratories, Los Angeles, Calif.

The use of tobacco and its alkaloid, nicotin, for the control of insects, began with the introduction of its use in floriculture, about 1890, when nurserymen and gardeners used tobacco stem fumigation as a means of protecting their flowers against insect life. These insects were destroyed by burning the tobacco stems, producing a dense smoke, and also by spreading the tobacco several inches deep in the greenhouses or beneath the plants.

In 1892, the first standardized extract of nicotin, called "Rose Leaf," was placed upon the market. This product contained slightly less than 3 per cent nicotin and had many disadvantages, being thick and gummy and was employed by exposing the extract to live steam under high pressure, and forcing the diluted vapors throughout the greenhouses by a system of pipes.

As early as 1898, the Florida Agricultural Experiment Station reported that Rose Leaf cost less, was easier to prepare, was more effective and had a wider range of application than any form of insecticide used up to that time.

The first entrance of nicotin into the control of animal parasites dates back to the early nineties, when sheep were first dipped for scabies, ticks and lice. It was soon proved that nicotin destroyed all three of these external parasites with a single dipping and was greatly superior to lime-sulfur solutions, arsenical dips and coal-tar previously used.

In 1910, Arnold developed a 40 per cent solution of sulfate of nicotin and for twenty years this product has been available, principally in the form of "Black Leaf 40."

Lamson found that Black Leaf 40 was an effective agent in the control of stomach worms of sheep. For several years nicotin had been given in various forms with the food, including tobacco stems, leaves and dust. Again, however, it was found that these were too uncertain in their nicotin content and with the advent of Black Leaf 40 it was possible to standardize the dose and obtain more efficient results than with copper sulfate treatment.

*Presented at the sixty-seventh annual meeting of the American Veterinary Medical Association, Los Angeles, Calif., August 26-29, 1930.

It was cheap, easy to obtain and did not have the prolonged after-effects of copper sulfate.

With this evidence of nicotin controlling external and internal parasites in sheep and cattle, Beach and Herms, in 1916, first employed tobacco stems for the control of poultry parasites. Beach found that by steeping finely chopped tobacco stems for two hours and mixing the stems and the liquid with about one-half of the usual ration of the ground feed and by fasting the birds for a day previous to the treatment, many roundworms were expelled. This treatment was followed by Epsom salt and repeated in ten days. Some evidence was secured to indicate that from ten to twenty-five per cent of the cecum worms also were removed by this method and it was suggested that the treatment be repeated at intervals of three to four weeks in an attempt to control these parasites. The fasting before and the purging after treatment caused a loss of egg-production and greatly shocked the birds, and was otherwise undesirable even though many worms were expelled.

A commercial poultryman of California provided the next step by recommending that commercial tobacco dust be mixed with the mash and fed over a period of time. Dougherty and Beach confirmed these results and recommended adding to the mash two per cent by weight of tobacco dust, containing 1½ per cent nicotin and feeding for a period of three or four weeks. For several years the tobacco dust treatment was the best known means of removing roundworms.

During the period from 1916 to 1923 many products were offered on the market, using nicotin sulfate as a base, which were sold under trade names and were no more efficient than steeped tobacco stems and no less harmful.

In 1924, Freeborn developed the first individual treatment for the elimination of roundworms, using nicotin sulfate as the active ingredient. He combined 7.9 grams of nicotin sulfate with 16 grams of a selected fullers' earth, known as Lloyd's Alkaloidal Reagent, and found that he could thus safely administer an amount of nicotin several times the lethal dose. This mixture was packed in a number two gelatin capsule, which, when filled, weighed from 350 to 400 milligrams. These capsules were administered by introducing them into the back of the throat and after locating them from the outside, forcing them into the crop with the thumb and forefinger. Freeborn reports an efficiency of 97.2 per cent for 312 birds treated.

It is not definitely known how fullers' earth protects the bird from the poisonous effects of nicotin, but it is a fact that the nicotin is both absorbed and adsorbed and the nicotin is undoubtedly released slowly enough that the birds are not seriously affected. A lethal dose of nicotin causes a depression on the somatic reflexes to the extent that respiration and other body processes cease.

In the early field application of the capsule treatment, quite a few birds were killed by leaving capsules in the back of the throat, since many nerve endings are exposed in this area. Other birds were suffocated by faulty application in that capsules were introduced into the trachea. When the capsule is placed well into the crop very little shock results.

Freeborn concludes that inasmuch as the fullers' earth loses its normal ability to remain in suspension when subjected to extracts of intestinal washings, there is a possibility that the direct cause of the nicotin being liberated is due to the derangement of its colloidal system from purely physical factors. It is quite evident that colloidal chemistry is seriously involved in this phenomenon.

Linsteadt found that certain colloids were safe carriers of nicotin and stated that molecular weights and sizes are determining factors in the protection granted to the bird. Since the molecular weight of nicotin (alkaloid) is 162.13 and of nicotin sulfate 211.17, it is thus seen that the alkaloid nicotin is more toxic to the bird than nicotin sulfate.

He successfully combined nicotin and casein and determined the molecular weight as 1297.13, more than six times that of nicotine sulfate, making it a safe carrier. With a thought of overcoming the undesirable features of the nicotin sulfate capsule, Linsteadt combined 10 per cent soap with his nicotin caseinate compound and produced a pellet of a size and shape that it could not enter the trachea and one which would be slippery when moistened and therefore not stick in the throat.

Many tests have been employed, by the writer, to determine the efficiency of this product, called "Nicocides." In no instance has the efficiency fallen below 99 per cent.

In an attempt to make a dual-purpose Nicocide for both tapeworms and roundworms, nicotin alginate and crude kamala were combined, using the same amount of nicotin with one gram of kamala. This has been done without sacrificing the efficiency of either ingredient when used singly and Freeborn states that the

dual nicocide produces less toxicity than the combining of kamala with nicotin sulfate. Undoubtedly molecular size is again involved, since nicotin alginate is approximately six times as heavy as nicotin caseinate and over thirty-seven times that of nicotin sulfate.

Older than the industry itself is the fight against body lice. Thirty years ago it was considered standard practice to get birds out of doors in the spring, as soon as sufficient road dust had accumulated to allow the birds an opportunity to smother the lice by dusting. This procedure, evidently regulated by an idiosyncracy of the species, was thought to be sufficiently effective to keep under reasonable control six of the seven recognized varieties of lice. These varieties have been named principally for their location on the bird, but do have several distinguishing characteristics, including size, shape and color. The one species not controlled by this "nature-provided treatment" is commonly called head lice and greasing with butter or lard was resorted to for control.

For several years tobacco dust, mixed with the road dust, has been officially recommended as an aid in minimizing the infestations of body lice.

Bishopp and Wood developed the sodium fluorid treatment, recommending both the dipping and dusting methods. Both were thoroughly efficient but laborious, hazardous and disagreeable to the operator.

In 1928, another commercial poultryman of California brought to the attention of the manufacturers of Black Leaf 40, a new use for their product, revolutionary in its application and far-reaching in its benefits to the industry because of its efficiency, availability and small cost per bird.

This poultryman found that he got a perfect kill of all varieties of lice by merely applying a thin film of nicotin sulfate, in the form of Black Leaf 40, to the roosts in the evening.

Freeborn, Lunn and Bittenbender, in rapid succession, verified these practical findings and standard recommendations for the use of this product are as follows:

Paint the roosts with a thin coating of undiluted Black Leaf 40 shortly before roosting time, using one-half pound to each one hundred feet of roosts, including cross-arms. If roosts have been whitewashed, clean off the lime completely before painting. Be sure that all birds are on the roosts for at least two successive nights following application. Leave ventilators open in the front

of the house, to provide sufficient air for the birds, but close ventilators above or behind the roosts to prevent fumes from being blown away too quickly.

Lice eggs hatch in from six to ten days, so examine birds ten to twelve days following treatment of the roosts to determine the necessity of repeating treatment. If more lice are found, the material should be applied again, at once, to prevent their developing into maturity and laying more eggs for another reinfestation. Under good conditions two treatments a year should prove adequate.

Nicotin is highly volatile at temperatures of 100 to 105 degrees Fahrenheit and is released by the body temperature of the fowl. Since lice breathe through the pores of the skin, they absorb the free nicotin and are killed by contact.

The advantages of this method of louse control are obvious:

1. No loss of egg-production.
2. No handling of birds.
3. Roost space for one thousand can be treated in one hour.
4. Meat is not flavored nor feathers stained.
5. Supplies are usually conveniently available.

Attempts to use free nicotin on the roosts have not been so successful as nicotin sulfate. Nicotin alginate has been found to remain on the roosts for a period of time longer than nicotin sulfate. This again is apparently due to the larger size molecules. While much has been done with nicotin in the field of poultry parasite control by practical poultrymen, investigators and private laboratories, there yet remains much to be accomplished. This is evidenced by the fact that new products, many of them inefficient and some actually harmful, are continually making their appearance.

Some manufacturers are diluting forty per cent nicotin sulfate as much as one-half by adding various sticky substances to back their claims of greater efficiency, for the eradication of lice.

The claims of many manufacturers of products for worm control may be similarly criticised. Just recently the writer received literature citing the merits of one which is a fair sample. To quote, "Now science has worked another wonder. Prof. Blank's great worm remedy not only removes all tapeworms, roundworms, etc., from the intestinal tract, but also makes all the thirty other parasitic worms drop off and disappear as though by magic."

The evident misstatement is accompanied by a sectional drawing of a fowl, picturing gape worms, gizzard worms, air sac mites and other parasites, quite probably attempting to demonstrate the "etc." group above referred to, or else part of the group of "thirty."

The writer deplores the present situation, which is costing the poultry industry many hundreds of thousands of dollars in wasted resources, lack of results, and a false security which surrounds the average poultryman after he has treated his flock with any one of these products, if they contain an insufficient quantity of nicotin sulfate or other of its compounds.

The time is rapidly approaching when the practicing veterinarian will be held directly responsible by the industry for the control of poultry parasites, and until such time as uniform legislation throughout the United States requires manufacturers to register the amount of nicotin employed per unit of treatment, the veterinarian must make sure that the amount is adequate to assure results from the use of those products, where nicotin is the active ingredient.

DISCUSSION

DR. W. R. HINSHAW: Is nicotin alginate a patented product?

DR. C. D. CARPENTER: It is a combination of free nicotin and alginic acid, manufactured by a private concern. I understand it is patented.

DR. HINSHAW: Is the composition of alginic acid available?

DR. CARPENTER: I am not familiar with the composition, and I believe it is not available.*

MEMBER: In relation to the practical side of the thing, don't you think it is safe, without question, to recommend the second painting of the roosts without examination of the birds.

DR. CARPENTER: It is good standard practice but it depends primarily on the general clean-up that the poultryman puts into effect. It depends entirely on the number of lice originally and the number of nits or lice eggs. We have found that in 80 per cent of the instances it has not been necessary to go back and repeat the treatment. It is safe to make the recommendation, but not always necessary.

DR. S. T. MICHAEL: Have you found the combined nicotin as efficient with worms?

DR. CARPENTER: We have not found a decrease in efficiency either for roundworms or tapeworms when used in the form of alginate and kamala. The form of nicotin sulfate and kamala, Freeborn's original recommendation, called for about three-fourths of a gram of kamala and the full roundworm capsule dosage of Lloyd's Alkaloidal Reagent. We found the efficiencies falling to 60 or 70 per cent under test, but in the case of the nicotin alginate and kamala, we have not found that to be the case.

MEMBER: Kamala has a purgative effect and I have heard the combination rushed the nicotin through a little too rapidly in the combination capsule.

DR. CARPENTER: I question whether that is an important item, because we are finding that we are getting worms expelled as quickly as two hours following the administration of nicotin caseinate alone, and in the case of nicotin alginate and kamala, we are getting worms expelled as shortly as five to ten hours following administration.

*Later information from Dr. Carpenter is to the effect that alginic acid is obtainable.

DR. H. J. STAFSETH: I don't know how many are going to make recommendations about Black Leaf 40, but if you do, keep these things in mind. Most people think, when treatment is recommended, that if little is good, much is better. The Michigan poultrymen grabbed this remedy like any other thing that has promise, and the remark made by Dr. Carpenter to the effect that it is a perfectly safe treatment is all right if it is used as per directions, but so many people, instead of putting on the amount required, will put on a lot to do a better job, and sometimes you will have an awful mess. I have seen the worst kind of diarrhea, intoxication and even unconsciousness follow the improper use of Black Leaf 40. If you have any clients to whom you wish to recommend this treatment, insist that this is not a treatment which can be used any old way they choose.

DR. CARPENTER: We have found the matter of nicotin intoxication has been largely a matter of ventilation of the house and that is why the recommendations are made by the company manufacturing Black Leaf 40 that the front should be open and the back reasonably well ventilated. In the beginning many people did encounter that situation as a result of closing the front of the house.

Iowa Makes New Record in Tuberculin Testing

More cattle were officially tuberculin-tested in Iowa in February than in any state in any month since the coöperative campaign to eradicate this malady began about twelve years ago. Of the 1,274,913 tuberculin tests in all states that month, Iowa made 223,710, or nearly one-fifth of the national total, according to Dr. A. E. Wight, in charge of tuberculosis eradication for the U. S. Department of Agriculture.

The remarkable achievement has received favorable comment by state and federal officials, since it comes at a time when the work is meeting with misguided opposition in some parts of the State. Herd-owners in Iowa evidently intend to continue the present rate of progress. On the first of March, according to federal records, there were 700,000 cattle on the waiting list to receive the test. This waiting list is more than double that of any other state.

The campaign is also making excellent progress in other states. In Minnesota, official veterinarians tested 167,465 cattle during February, while Illinois showed 120,633 tests and Wisconsin 96,113. There are now 1,145 counties that have reduced the extent of tuberculosis in cattle to one-half of 1 per cent or less, thus placing such counties in the so-called modified accredited area.

Fur Industry in Alaska

It is estimated that there are 36,000 blue foxes on about 275 ranches in Alaska, valued at nearly $7,000,000. Mink and marten also are being raised extensively.

FERTILITY STUDIES IN THE BULL

I. Studies of the Genitalia of Bulls Obtained From the Abattoir*

By C. R. DONHAM† *and* B. T. SIMMS

Department of Veterinary Medicine

Oregon Agricultural Experiment Station, Corvallis, Oregon

INTRODUCTION

As soon as attempts were made to study the problem of sterility in cattle, the authors realized the necessity of more accurate knowledge of both the normal and abnormal generative organs. This paper is based upon the records of examinations of the genitalia of some 201 bulls. Results of these studies agree very closely with the previously recorded work of Gilman.[1]

METHODS AND MATERIALS

Most of these studies were made in a large packing-house, during the summer months, when the daily maximum temperatures were ranging from 90 to 100° F. The routine method of handling animals was such that approximately 45 minutes passed between the time that the cattle were killed and the final inspection, when the genital organs could be removed. Preliminary observations indicated that during the summer weather, it was not satisfactory to allow this much time to pass before the organs were cooled.

Consequently the practice was adopted of removing the genital organs immediately after the bulls were killed and placing them in a refrigerator at a temperature of approximately 32° F. After they were thoroughly chilled they were taken to a laboratory for examination. In one instance such material remained at approximately 32° F. for 69 hours before laboratory observations were made. Since spermatozoa from these specimens showed normal motility for at least 2½ hours after microscopic examinations were first made, it was considered that this method of handling was not causing serious changes in the organs.

It was noticed, however, that an odor of decomposition developed in such organs held for such long periods in the refrigerator. This change, it seemed, was very rapid in such

*Presented at the sixty-seventh annual meeting of the American Veterinary Medical Association, Los Angeles, Calif., August 26-29, 1930.

†Resigned, July 15, 1929.

material, when it was removed to the laboratory with the usual summer temperatures. Consequently microscopic preparations of spermatozoa were made as soon as possible after the material left the ice-box.

Gross lesions were observed by examining the fresh material. Microscopic studies were made of various representative portions of the organs by placing such portions in formaldehyde, sectioning in paraffin and staining with eosin and hematoxylin.

In examining spermatozoa a sharp knife was used to incise the organ from which the cells were to be collected. The exposed surface of the organ was then touched to a glass slide and a cover-slip was placed over this immediately. Examinations of such preparations were made with a number 5 eye-piece and a 4-mm. objective.

Results of Observations

The scrotum: In these studies 75.88 per cent of the genitalia examined showed adhesions in the scrotum. These were between the parietal layer of the tunica vaginalis, and either the tail of the epididymis or a larger portion of the epididymis and a part of the testicle. The extent of such adhesions varied a great deal. In some instances there were only a few strands of tissue, while in others they were so numerous and well developed that it was impossible to break them down with the fingers. No correlation could be established between the presence of these adhesions and the age, size, general condition, or breed of the bull being examined. There was usually no evidence of traumatism of the skin of the scotum in such cases. Neither could any definite relation between these lesions and abnormal conditions of either the testicular tissue or the tubules of the epididymis be established.

Bacteriological studies of a few of these cases revealed the presence of various types of microörganisms in some of the cases while others were apparently sterile. No particular type of bacteria was isolated from any large percentage of those examined.

Agglutination tests with *Brucella abortus* antigen were made with sera from nineteen bulls showing such lesions. Only two of these were positive.

No correlation could be established between the presence of these adhesions and the estimated percentage of motility of spermatozoa taken from various points along the genital tract.

Testicles: With the exception of the adhesions mentioned above, the testicles appeared normal to the unaided eye in a very high percentage of the cases. One case of tuberculosis was found and a few organs were seen which contained either abscesses or hematomata. An occasional testicle showed some edema.

Microscopic examinations of preparations of the testicles rather frequently revealed a desquamation of the germinal epithelium. No correlation could be found between this and the adhesions on the serous surface. Such desquamation did not occur more frequently in testicles with spermatozoa of low motility than in those containing normal spermatozoa.

Epididymes: With the exception of the adhesions previously mentioned, macroscopic lesions of these organs were not noticed. Microscopic sections revealed desquamation of the epithelium rather frequently. This could not be correlated with either the adhesions on the serous surface or any abnormalities of the secretions contained in the tubules.

Seminal vesicles: These organs showed marked variation in color. Pink was considered normal. Of the 133 specimens examined, 54 showed variations from this color. Of these, 23 were recorded as yellow, 16 as gray, 14 as red, and one as orange.

In many animals, there was a definite variation in the size of the two vesicles. In such cases the larger vesicles were usually of a distinct yellow color. Both gross and microscopic examinations indicated fibrosis in these organs.

In one instance a tuberculous condition involved the vesicles.

Microscropic preparations revealed desquamation of the epithelium of the vesicles in a considerable percentage of the cases. This condition could not be correlated with any other changes in the organ.

Spermatozoa: Motile spermatozoa were observed at all points along the genital tract. The most satisfactory points for collection of material for routine examination seemed to be the ampulla of the ductus deferens. These ampullae are enlarged glandular portions of the duct. They are 4 to 5 inches in length and are located just anterior to the junction of the ducti deferentia with the urethra. Secretions collected at this point have not yet been mixed with the products of the seminal vesicles, prostate, and bulbo-urethral glands.

The character of the secretions found in the ampullae varied from a thin, fairly clear, watery fluid to one that was thick, rather tenacious and cream colored. Of 80 specimens examined,

there were 34 which were thick, tenacious and cream colored, and in these there were large numbers of motile spermatozoa. In 43 specimens the secretion was thin, clear and watery. Thirty-eight of these contained comparatively few spermatozoa. Of the remaining three cases the secretion was thin, clear and watery from one ampulla, and thick, tenacious and cream colored from the other.

These same variations in the physical characteristics of the secretions were found in the material collected from the tail of the epididymis. In those specimens which were thick, tenacious and cream colored, the motility of the spermatozoa was frequently accelerated through dilution with .85 per cent sodium chlorid. A limited number of these secretions were diluted with an excess of the fluid from the seminal vesicles. Motility of the spermatozoa was either severely retarded or completely stopped following such dilutions.

The types of movement observed agreed quite accurately with the description of such movement which has been given by Reynolds.[2] No attempts were made to differentiate between normal and abnormal movements. If an individual cell was observed for a considerable length of time, it might be found to move vigorously, cease all motion for a while, and then begin vigorous movement again. Furthermore, individual cells were frequently noted which changed the type of movement from time to time.

Only one variation from the usual appearance of spermatozoa was observed in this series of examinations of living cells. This was an additional round mass which surrounded the tail of the cell at some point. It was apparently being thrown off, as such a mass might be at the upper extremity of the tail in one instance and down near the free extremity in another. Gilman[1] has described this as being a mass of discarded cytoplasm. Such forms were consistently found when material for observation was taken from the head of the epididymis and were not found in material from any part of the genital tract.* These forms were not satisfactorily demonstrated in stained specimens.

None of the numerous abnormal forms of spermatozoa described and photographed in literature were observed in these specimens

*These same forms have been observed in one instance on the spermatozoa of a bull after normal coition. This animal was being bred excessively. The cows appeared normal but were not conceiving. An indefinite sexual rest was advised and after 21 days another sample of semen examined did not contain spermatozoa with these peculiarities. Only about 20 per cent of the cells were motile, however. A change of bulls being used on the herd resulted in a high percentage of conceptions at the first mating.

which were examined without any manipulation such as fixing, heating or staining. Many times cells were observed in a resting position which at first examination appeared abnormal in either size or shape. When they changed their positions later, however, they were apparently perfectly normal cells. This was best observed toward the end of the period of movement of the cells and was particularly true when the spermatozoon was observed from the edge rather than from the side. The concavity and convexity of the heads of the spermatozoa allowed the free margins of the head to change their positions, thus completely altering their shapes.

It was not uncommon to find two or even three spermatozoa in a resting position piled one upon the other so that the appearance of the double-headed or double-tailed cell was seen. When these same groups were observed in motion, occasionally they remained more or less stuck together for some little while but finally completely separated and only normal cells were present.

In slides of living spermatozoa taken from the head of the epididymis ciliated epithelial cells were frequently seen in the specimens. These showed very vigorous movement which affected all the material in the microscopic field. The cilia moved so rapidly that they often could not be distinguished as individuals. Under such conditions the epithelial cells would cross the field rather rapidly. They had somewhat the appearance of a ciliated, free-living protozoon and were the cause of much speculation until they were identified as ciliated epithelial cells from the lining of the ducts.

Only a limited number of specimens of the secretions were fixed and stained. In such manipulations the most simple technic of air-drying, fixing and staining with either eosin, methylene blue, or carbol-fuchsin was used. In a few cases pus cells were found. These were associated with gross pathological conditions of the epididymes.

It was extremely easy to cause separation of the heads and tails of cells in fixing and preparing the stained slides. In fact, it was almost impossible to make such preparations without finding an appreciable percentage of separated heads and tails. When these were checked with examinations of living cells, no such forms were found.

When deliberate attempts were made to separate heads and tails through a rough, careless technic, such as smearing them on

the slide with an instrument, as high as fifty per cent of such separated cells were observed.*

Discussion

The cause of the adhesions between the serous surfaces in the scrotum was not determined. It is suggested that a high percentage of these are the direct result of mechanical injury. It is realized that the position of the scrotum of the bull might facilitate such injury. Furthermore, it is well known that bulls very frequently kick forward rather vigorously with their hind legs when flies or other sources of irritation are on the skin of the lower portion of the abdominal wall.

The various types of bacteria which were isolated from tissues adjoining the adhesions were not considered of particular significance. The absence of lesions in the other genital organs seems to indicate that these conditions were not the result of infection which had been introduced through the urethra.

It is impossible to say what percentage of these animals had shown definite symptoms during life. Clinical observations of mature bulls have indicated, however, that mild inflammatory conditions of the scrotum and its contents are not very unusual.

The desquamation of epithelium noticed in the testicles as well as in the other portions of the genital tract was quite possibly the result of changes which took place after the organs were removed from the bulls. Since no other changes, either gross or microscopic, could be associated with this desquamation, no particular significance was attached to it.

The results obtained through adding an excess of the fluid of the seminal vesicles to suspensions of spermatozoa cannot be explained from the data obtained in these studies. No attempts were made to determine the chemical reaction or the physical properties of these seminal fluids.

It is quite obvious that these studies of the genitalia of bulls are not complete enough to allow definite conclusions to be drawn. In the future, it is suggested that other workers who may make such observations should attempt to get breeding histories of the animals examined. This will manifestly make the data much more valuable.

Summary

1. In studying the genital organs of 201 bulls the most common gross lesion observed was the presence of adhesions in the scrotum.

*This variation in percentage of separated heads and tails, according to the technic used, has been observed also in examining spermatozoa collected from the vagina after coition.

2. The cause of these adhesions was not determined. They were not associated with the presence of agglutinins for *Brucella abortus* in the blood sera.

3. These adhesions were not associated with either gross or microscopic changes which could be observed in the genital organs. Motility of the spermatozoa was not apparently any less in animals showing such lesions than in those without them.

4. The seminal vesicles showed considerable variation in size, consistency and color. The most frequent abnormal condition in these organs was a fibrosis.

5. The examinations of fresh material resulted in finding motile spermatozoa in all portions of the testicle and the ducts leading from it.

6. The ampulla of the ductus deferens was the most satisfactory organ for the collection of spermatozoa for microscopic examinations.

7. The character of the secretions in the ampulla varied from thin, watery, and almost clear, to thick, tenacious, and cream colored.

8. The thick, tenacious, cream-colored secretions usually contained large numbers of spermatozoa. The thin, watery, clear secretion usually contained only small numbers of spermatozoa.

9. In those specimens which were thick and cream colored, dilution with .85 per cent sodium chlorid seemed to increase the motility.

10. Secretions of the seminal vesicles either retarded or inhibited motility of spermatozoa.

11. Sperm cells were observed which showed vigorous movement, came to a complete rest and then showed vigorous movement again.

12. The various abnormalities in morphology which have been described were not observed in these fresh secretions.

13. Stained specimens of the same secretions showed occasional cells with the head and tail separated. The percentage of such forms was materially increased through excessive manipulation of the cells.

REFERENCES

[1]Gilman, H. L.: A study of some factors influencing fertility and sterility in the bull. Rpt. N. Y. State Vet. Coll., 1921-1922, Legislative Document 32 (1923), State of New York, pp. 68-126.

[2]Reynolds, E.: Fertility and sterility. Jour. Amer. Med. Asso., lvii (1916), 17, pp. 1193-1199.

FERTILITY STUDIES IN THE BULL

II. The Relation of the Microscopic Findings in Semen to its Fertility*

By C. R. DONHAM,† B. T. SIMMS *and* J. N. SHAW‡

Department of Veterinary Medicine,

Oregon Agricultural Experiment Station, Corvallis, Oregon

INTRODUCTION

Beginning in 1919, studies have been under way which included the relation of the bull to the reproduction problem in cattle. This paper gives the results of a part of the microscopic studies of seminal specimens collected during this period. The literature has been reviewed and many helpful suggestions have been received from the various publications concerning spermatozoa.

No definite technic has been worked out by any investigator, however, which could be adopted *in toto* by the authors. Consequently it has been more or less necessary to devise means and develop methods as the work progressed.

METHODS AND MATERIALS

Collection of specimens: Attempts at collecting pure specimens of semen, either through the use of a breeding-bag or through the discharged semen which escapes from the penis either before or after mounting the cow, were not successful. The breeding-bags which were tried out caused the bulls to be very slow in service. In some instances they would not serve at all when the bags were used. While some bulls did discharge semen before mounting the cow and others occasionally discharged some after dismounting, in a relatively high percentage of the cases no semen could be collected in this way.

The procedure was adopted, therefore, of collecting all seminal specimens from the vaginas of cows immediately following service. In some instances vaginal examinations were made of these animals before mating took place. If there was an excess of mucinous material in the vagina, this was flushed out with sterile physiologic saline solution. If the amount of mucinous material

*Presented at the sixty-seventh annual meeting of the American Veterinary Medical Association, Los Angeles, Calif., August 26-29, 1930.

†Resigned, July 15, 1929.

‡Dr. F. W. Miller, who resigned Dec. 15, 1925, did a great deal of the preliminary work on this problem.

was not excessive and it was apparently normal in appearance, the cows received no treatment whatever before mating. In some instances when only a slight excess of such material was in the vagina, a part of it was removed with the hand but no solution was introduced.

In some instances the mixture of semen and vaginal content was removed with the hand and placed in a glass tube for transportation to the laboratory, or preservation until examination could be made. In other instances such material was removed with a glass tube which had a suction bulb at one end. The tube was introduced well into the vagina and filled with material.

Microscopic examination: In all instances microscopic examinations were made as soon as were practicable after seminal specimens were obtained. In experiment animals such specimens were taken to the laboratory for the routine examination. In field work the microscope was sometimes used in the barn and at other times in the residence of the owner, depending somewhat upon temperatures and other conditions. No special precautions were taken in regard to the temperatures of the specimens, but they were protected from direct sunlight.

In making examinations, direct smears of the material were made on ordinary microscopic glass slides. In some instances these were covered with cover-slips, while in others they were examined uncovered. If the material was extremely viscid, .85 per cent sodium chlorid solution was sometimes used for dilution. In using the microscope a high enough magnification was employed to enable the worker to see the individual cells and observe the type of movement. The number 5 eye-piece and 4-mm. objective gave satisfactory results.

Bulls examined: These examinations included two groups of bulls. One of these consisted of those animals which were submitted by their owners for examination. In some instances their breeding records were not obtained. Others were in herds which were examined later for pregnancy results. This enabled the workers to tabulate the pregnancies and the numbers of services, and correlate these with the results of the microscopic examination. These bulls were all located in one county in western Oregon where spring calving is practiced, and the year's breeding is nearly all done within a few weeks. The second group included the bulls in experiment herds under direct observation of the workers for considerable periods. Accurate breeding and calving records were available in all these herds.

Records: In all examinations attempts were made to estimate the percentages of motile spermatozoa present. These were recorded in groups as 90 to 100 per cent motile, 75 to 90 per cent motile, 50 to 75 per cent, 25 to 50 per cent, and below 25 per cent. In all instances such percentages were estimates only. Those specimens exhibiting 90 per cent motile spermatozoa or above were considered normal.

Field Studies

In field studies, there were 101 examinations of semen from bulls whose breeding records were not obtained. Of these, 47.52 per cent were recorded as having normal motility and 52.48 were below normal (table I).

Table I—*Field studies. Seminal examinations in which pregnancy results were not obtained*

Seminal Examinations	Estimated Percentage of Motility of Spermatozoa									
	90–100%		75–90%		50–75%		25–50%		0–25%	
	No.	%	No.	%	No.	%	No.	%	No.	%
101	48	47.52	19	18.81	12	11.88	1	0.99	21	20.79

	No.	%
Normal motility above 90%	48	47.52
Below normal motility	53	52.48
Totals	101	100.00

Seventeen bulls whose breeding records were available were examined (table II). Twenty-four seminal examinations were made from these 17 animals, nine from the group of seven bulls with apparently normal sperm cells and fifteen from the group of ten with apparently abnormal spermatozoa. Pregnancy followed five (55 per cent) of the nine services by the normal group and five (33 per cent) of the fifteen services by the abnormal group. During this breeding season, 181 cows were mated to the normal bulls and 130 (75 per cent) became pregnant. There were 273 services, or 2.1 services per pregnancy. The abnormal bulls were mated to 207 cows and 118 (57 per cent)became pregnant. There were 348 services, or 2.94 per pregnancy. Thus the results of both groups for the entire breeding season were very similar to those for the 24 services following which microscopic examinations were made. There were 621 serivces by both groups with 248 (39.9 per cent) pregnancies.

TABLE II—*Field studies. Relation of seminal picture to pregnancy and to breeding efficiency in bulls*

Estimated Motility of Spermatozoa	Bulls Examined	Examinations	Examined Service Resulted in Pregnancy		Total Services of Season				Average Services per Pregnancy	Services Resulting in Pregnancy (%)
			Number	Per Cent	Cows Bred	Services	Pregnancies	Cows Preg- (%)		
Normal Motility (Above 90%)	7	9	5	55.55	181	273	130	75.13	2.10	47.61
Below Normal Motility	10	15	5	33.33	207	348	118	57.00	2.94	33.89
Totals	17	24	10	41.66	388	621	248	63.93	2.50	39.94

Note: Two bulls in this study showed irregularity of estimated motility of spermatozoa on subsequent examinations, but could not be included in this table because all data were not available.

TABLE III—*Relation of seminal picture to pregnancy at that service and relation of successive seminal pictures of the same bull*

(Italicised figures indicate numerical order of services. Other figures give dates of services.)

Bull	Results	Estimated Percentage of Motility of Spermatozoa					Totals	
		90%–100%	75%–90%	50%–75%	25%–50%	0%–25%		
1	Pregnant	*13*: 4-13-25 *15*: 7-19-25 *17*: 9-23-26 *18*:10- 8-26 *19*:10-18-26 *25*:12- 7-26 *30*: 3-17-27		*32*: 4-27-27				
	Totals	7	0	1	0	0	8	
	Not Pregnant	*1*: 5- 8-24 *3*: 7-11-24 *8*: 2-26-25 *9*: 3- 5-25 *10*: 3- 7-25 *11*: 3-17-25 *12*: 3-20-25 *14*: 6-10-25 *20*:10-20-26 *21*:11-13-26 *29*: 2-24-27	*4*: 8-13-24 *6*:12-22-24	*5*:12- 9-24 *16*: 2- 8-26 *27*: 1- 9-27 *28*: 2- 9-27 *31*: 4- 1-27	*2*: 6-18-24 *23*:11-13-26 *24*:12- 3-26	*7*: 1-19-25 *22*:11-17-26 *26*:12-13-26		
	Totals	11	2	5	3	3	24	32
2	Pregnant	*3*: 2- 2-24 *4*: 5-14-24 *6*: 7-21-24 *7*: 8-19-24 *9*:12-17-24 *10*: 3-12-25 *11*: 3-28-25 *12*: 4-16-25 *14*: 2-24-26 *17*:11-16-26 *18*:12-16-26		*2*: 1- 2-24 *13*: 2-10-26		*8*:12- 6-24		
	Totals	11	0	2	0	1	14	
	Not Pregnant	*1*:10-22-23 *5*: 7-14-24 *16*:11-12-26 *19*: 2-21-26		*15*:10-17-26		*20*: 2-23-27		
	Totals	4	0	1	0	1	6	20
3	Pregnant	*8*: 6-27-24 *9*: 8-19-24 *12*: 3- 3-25 *13*: 3- 7-25 *15*: 8-10-25 *17*: 1- 9-27 *19*: 2- 9-27	*3*: 2- 6-24 *5*: 3-10-24	*16*:11-16-26				
	Totals	7	2	1	0	0	10	

TABLE III—*Relation of seminal picture to pregnancy at that service and relation of successive seminal pictures of the same bull—Continued*

(Italicised figures indicate numerical order of services. Other figures give dates of services.)

BULL	RESULTS	ESTIMATED PERCENTAGE OF MOTILITY OF SPERMATOZOA					TOTALS	
		90%–100%	75%–90%	50%–75%	25%–50%	0%–25%		
3	Not Pregnant	*2*: 1-30-24 *10*: 1-19-25	*4*: 2- 9-24 *6*: 3-17-24 *7*: 5- 8-24 *11*: 2-18-25 *14*: 4-15-25		*1*:10-22-23	*18*: 1-17-27		
	Totals	2	5	0	1	1	9	19
4	Pregnant	*9*: 3-27-25						
	Totals	1	0	0	0	0	1	
	Not Pregnant	*1*:10-15-23 *4*: 6-18-24 *5*: 7-10-24 *7*:12- 8-24 *8*: 3- 5-25 *10*: 4-13-25	*11*: 6- 9-25	*2*: 3-17-24 *6*:10-17-24 *12*: 6-17-25 *13*: 8- 5-25	*3*: 4- 7-24			
	Totals	6	1	4	1	0	12	13
5	Pregnant	*5*: 7-21-24 *6*: 3-23-25 *8*: 4-13-25						
	Totals	3	0	0	0	0	3	
	Not Pregnant	*2*: 2- 2-24 *7*: 4- 9-25 *9*: 5-27-26		*1*:12-28-23 *3*: 2- 9-24 *4*: 5-15-24				
	Totals	3	0	3	0	0	6	9
6	Pregnant	*3*: 4- 8-25 *5*: 3-25-26 *8*: 5-20-27						
	Totals	3	0	0	0	0	3	
	Not Pregnant		*6*:12- 4-26	*1*: 1-15-25 *2*: 3- 3-25 *4*: 8- 7-25		*7*: 4- 8-27		
	Totals	0	1	3	0	1	5	8
7	Pregnant	*4*: 7-10-24 *5*:10-24-24	*3*: 5-15-24	*1*: 3-29-24 *2*: 4-15-24				
	Totals	2	1	2	0	0	5	
	Not Pregnant							
	Totals	0	0	0	0	0	0	5

TABLE III—*Relation of seminal picture to pregnancy at that service and relation of successive seminal pictures of the same bull—Continued*

(Italicised figures indicate numerical order of services. Other figures give dates of services.)

BULL	RESULTS	ESTIMATED PERCENTAGE OF MOTILITY OF SPERMATOZOA					TOTALS	
		90%–100%	75%–90%	50%–75%	25%–50%	0%–25%		
	Pregnant	*1*: 5-27-26		*4*:10-20-26				
	Totals	1	0	1	0	0	2	
8	Not Pregnant	*2*: 5-28-26 *3*:10- 8-26						
	Totals	2	0	0	0	0	2	4
	Pregnant							
	Totals	0	0	0	0	0	0	
9	Not Pregnant	*1*: 3-30 27	*3*: 5-24-27			*2*: 5-24-27		
	Totals	1	1			1	3	3
	Pregnant							
	Totals	0	0	0	0	0	0	
10	Not Pregnant	*1*: 4-18-27 *2*: 4-27-28						
	Totals	2	0	0	0	0	2	2
	Pregnant				*1*:10-19-23			
	Totals	0	0	0	1	0	1	
11	Not Pregnant		*2*: 1- 8-24					
	Totals	0	1	0	0	0	1	2
	Pregnant			*1*:10-15-23				
12	Totals	0	0	1	0	0	1	
13 14	Not Pregnant			*1*:10-23-23		*1*: 1- 9-23		
	Totals	0	0	1	0	1	2	3
	Grand Totals	66	14	25	6	9	120	

TABLE IIIa—*Totals of table III on relation of seminal picture to pregnancy at that service*

ESTIMATED PERCENTAGE OF MOTILITY OF SPERMATOZOA	RESULTED IN PREGNANCY		PREGNANCY FAILURES		TOTALS
	No.	%	No.	%	
90-100	35	53.03	31	46.97	66
75- 90	3	21.42	11	78.58	14
50- 75	8	32.0	17	68.0	25
25- 50	1	16.66	5	83.34	6
0- 25	1	11.11	8	88.89	9
Totals	48	40.0	72	60.0	120

TABLE IIIb—*Summary*

MOTILITY	RESULTED IN PREGNANCY		PREGNANCY FAILURES		TOTALS
	No.	%	No.	%	
Normal (above 90%)	35	53.03	31	46.97	66
Below 90%	13	24.07	41	75.93	54
Totals	48	40.0	72	60.0	120

TABLE IV—*Relation of promptness and vigor of coition to pregnancy and seminal picture (studies with 14 bulls)*

TYPE OF COITION	RESULTED IN PREGNANCY		PREGNANCY FAILURES		SPECIMENS SHOWING NORMAL MOTILITY		SPECIMENS SHOWING BELOW NORMAL MOTILITY		SPECIMENS SHOWING NORMAL STAINING SPERMATOZOA		SPECIMENS SHOWING ABNORMAL FORMS OF STAINED SPERMATOZOA	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Prompt and vigorous	30	40	45	60	42	56	33	44	64	87.62	9	12.32
Slow. Lack of vigor	15	50	15	50	17	56.67	13	43.33	28	87.50	4	12.50
Totals	45	42.85	60	57.15	59	56.20	46	43.80	92	87.62	13	12.38

Note: Some of the examinations listed in Table III could not be included in this study because the promptness and vigor of coition was not observed.

Bulls in Experiment Groups

Relation of seminal pictures to pregnancy resulting from service: There were 120 seminal examinations made with specimens collected from the 14 bulls in this group (table III). Of these, 66 specimens were recorded as having normal motility and 53.03 per cent of them resulted in pregnancy. Fifty-four specimens were considered as being below normal, with 24.07 per cent of this group producing pregnancy.

During the time these studies were under way these bulls had a total of 375 services the results of which were known. Of these, 142 (37.8 per cent) resulted in pregnancies.

Constancy of seminal pictures of bulls examined repeatedly: The numbers of examinations made of seminal specimens from the bulls used in these studies varied from a total of 32 in one animal to only one each in three different animals. Every animal which was examined more than twice showed considerable variation at the times of the different examinations (table III). A good specimen collected at one service was not infrequently followed by a poor one at the next service and vice versa.*

Relation of promptness and vigor of service to seminal picture and fertility: Records of promptness and vigor of service were made in 105 matings with these bulls (table IV). Of these, 75 were recorded as being prompt and vigorous and 40 per cent of them resulted in pregnancies. There were 30 which were recorded as being slow or lacking in normal vigor. Fifty per cent of these resulted in pregnancy. Of the 75 prompt and vigorous services, 56 per cent showed normal motility when the seminal specimens were examined microscopically. Of the seminal specimens collected from the 30 slow services, 56.67 per cent were considered normal.

Relation of frequency of coition to seminal picture and pregnancies: In this group of bulls the three which were used for service most frequently were studied to determine whether there was any possible relation between the amount of service, the seminal picture, and the percentage of pregnancies (tables V, VI and VII). Since the breeding records of these three animals varied so greatly, the individual record of each has been tabulated. The records of previous services in a three-day period, a seven-day period, and a thirty-day period were tabulated. There

*On two different occasions bulls not included in this series showed marked variations in two seminal specimens collected within an hour of each other. In both instances the first specimen contained spermatozoa with a low percentage motility, while the second specimen contained sperm cells of normal motility.

TABLE V—*Bull 1*

EXAMINATIONS	NORMAL MOTILITY (ABOVE 90%)		BELOW NORMAL MOTILITY		PREVIOUS SERVICES AND RESULTS					
	PREGNANT	NOT PREGNANT	PREGNANT	NOT PREGNANT	PREVIOUS 3 DAYS		PREVIOUS 7 DAYS		PREVIOUS 30 DAYS	
					S.	P.	S.	P.	S.	P.
1		10-22-23			0	0	0	0	1	0
2			1- 2-24		1	1	1	1	1	1
3	2- 2-24				0	0	0	0	2	2
4	5-14-24				0	0	0	0	1	1
5		7-14-24			0	0	1	?	2	1 + ?
6	7-21-24				0	0	1	0	2	0 + ?
7	8-19-24				0	0	0	0	2	2
8			12- 6-24		0	0	0	0	3	2
9	12-17-24				1	1	1	1	4	3
10	3-12-25				0	0	1	0	3	1
11	3-28-25				0	0	0	0	2	1
12	4-16-25				1	1	1	1	4	4
13			2-10-26		0	0	0	0	1	1
14	2-24-26				0	0	0	0	1	1
15				10-17-26	0	0	1	1	1	1
16		11-12-26			1	0	1	0	4	1
17	11-16-26				2	1	4	1	7	2
18	12-16-26				0	0	0	0	5	2
19		2-21-27			0	0	1	0	5	1
20				2-23-27	1	0	2	0	6	1
	11	4	3	2	7	4	15	5 + ?	57	28

S = Services
P = Pregnancy

Total number pregnant.....14 (70%)
Total number not pregnant.....6 (30%)
Total number examinations.....20 (100%)

TABLE Va—*Total services of bull I during the interval of seminal examinations (10-22-23 to 2-23-27)*

SERVICES	SERVICES WITH PREGNANCY RESULTS	PREGNANT		NOT PREGNANT		RESULTS UNKNOWN	NUMBER OF DAYS PER SERVICE
		No.	%	No.	%		
96	95	59	62.1	36	37.9	1	12.29

was not established any definite correlation between frequency of service and either the seminal picture or the fertility as indicated by conception. There was a marked variation in the results obtained from mating these animals, the one being mated most frequently showing the smallest percentage of fertility. But there was no definite indication that this animal of low fertility improved following rest periods of considerable length.

TABLE VI—*Bull 2*

Examinations	Normal Motility (Above 90%)		Below Normal Motility		Previous Services and Results					
					Previous 3 Days		Previous 7 Days		Previous 30 Days	
	Pregnant	Not Pregnant	Pregnant	Not Pregnant	S.	P.	S.	P.	S.	P.
1				10-22-23	0	0	0	0	1	0
2		1-30-24			0	0	0	0	0	0
3			2- 6-24		0	0	1	0	1	0
4				2- 9-24	1	1	1	1	2	1
5			3-10-24		0	0	0	0	1	1
6				3-17-24	1	0	2	1	3	2
7				5- 8-24	0	0	0	0	2	0
8	6-27-24				0	0	0	0	2	2
9	8-19-24				1	Sold ?	1	?	4	2 ?
10		1-19-25			0	0	0	0	0	0
11				2-18-25	0	0	1	0	3	1
12	3- 3-25				0	0	0	0	2	0
13	3- 7-25				0	0	1	0	3	0
14				4-15-25	0	0	0	0	1	0
15	8-10-25				1	1	1	1	2	2
16			11-16-26		0	0	0	0	2	1
17	1- 9-27				1	0	1	0	5	4
18				1-17-27	0	0	0	0	6	4
19	2- 9-27				0	0	0	0	3	1

S = Services
P = Pregnant

Total number pregnant.....10 (52.63%)
Total number not pregnant..... 9 (47.37%)
Total number examinations.....19 (100%)

TABLE VIa—*Total services of bull II during the interval of seminal examinations (10-22-23 to 2-9-27)*

Services	Services with Pregnancy Results	Pregnant		Not Pregnant		Results Unknown	Number of Days per Service
		No.	%	No.	%		
85	82	36	43.90	46	56.10	3	14.18

Measurements: Attempts were made to measure the spermatozoa on stained slides and correlate such measurements with pregnancy results. Either the technic used was not careful enough, or there were no appreciable variations between the cells measured from specimens of low fertility and those from specimens of high fertility.

Chemical and physical properties: Attempts were made to study the chemical reaction of seminal specimens both through the use of a simple colorimetric test and by an electrometric test. Sig-

TABLE VII—*Bull 3*

Examinations	Normal Motility (Above 90%)		Below Normal Motility		Previous Services and Results					
					Previous 3 Days		Previous 7 Days		Previous 30 Days	
	Pregnant	Not Pregnant	Pregnant	Not Pregnant	S.	P.	S.	P.	S.	P.
1		5- 8-24			0	0	0	0	0	0
2				6-18-24	2	0	6	1	15	1
3		7-11-24			0	0	1	0	12	1
4				8-13-24	1	0	3	0	10	3
5				12- 9-24	2	0	2	0	11	2
6				12-22-24	0	0	1	0	11	2
7				1-10-25	0	0	1	0	11	1
8		2-26-25			0	0	0	0	0	0
9		3- 5-25			0	0	0	0	1	0
10		3- 7-25			1	0	1	0	2	0
11		3-17-25			1	0	2	0	4	1
12		3-20-25			1	0	2	0	6	1
13	4-13-25				0	0	1	0	8	1
14		6-10-25			2	0	3	0	4	0
15	7-19-25				0	0	0	0	5	2
16				2- 8-26	?		?		?	
17	9-23-26				1	?	2	?	2	?
18	10- 8-26				0	0	0	0	4	1
19	10-18-26				2	0	2	0	6	2
20		10-20-26			3	1	3	1	6	2
21		11-13-26			2	1	2	1	12	6
22				11-17-26	0	0	3	1	11	5
23				11-23-26	0	0	1	0	8	4
24				12- 3-26	0	0	0	0	6	2
25	12- 7-26				2	1	3	1	9	3
26				12-13-26	0	0	1	1	8	3
27				1- 9-27	0	0	0	0	2	0
28				2- 9-27	1	1	2	1	5	2
29		2-24-27			0	0	0	0	3	1
30	3-17-27				0	0	0	0	2	0
31				4- 1-27	0	0	0	0	2	1
32			4-27-27		0	0	0	0	2	1

S = Services
P = Pregnant

Total number pregnant..... 8 (25%)
Total number not pregnant.....24 (75%)
Total number examinations.....32 (100%)

TABLE VIIb—*Total services of bull 3 during the interval of seminal examinations (5-8-24 to 4-27-27)*

Services	Services with Pregnancy Results	Pregnant		Not Pregnant		Results Unknown	Number of Days per Service
		No.	%	No.	%		
212	198	46	23.23	152	76.77	14	5.11

TABLE VIII—*Summary of tables V, VI and VII (bulls 1, 2 and 3)*

Services	Services with Pregnancy Results	Pregnant		Not Pregnant		Results Unknown	Average Days per Service	Average Services per Pregnancy
		No.	%	No.	%			
393	375	141	37.60	234	62.40	18	8.93	2.65

SEMINAL EXAMINATIONS

Total number pregnant.....32 (45.07%)
Total number not pregnant.....39 (54.03%)
Total number examinations.....71 (100%)

nificant variations were not observed, but it was felt that the methods used were not sufficiently accurate to be reliable.

The physical properties of specimens obtained from the vaginas varied a great deal. Some were thick, tenacious and cream colored, while others were quite thin and watery. Since all such specimens consisted of a mixture of both the female and male secretions, it was not possible to determine definitely just what influence each secretion had on the appearance of the specimen. It was believed however, that the semen itself shows very considerable variation.

DISCUSSION

The principal importance of the group of field studies lay in the fact that these observations agreed so closely with those made in the animals in the experiment herd. Furthermore, the percentage of pregnancies resulting from the entire group of services recorded (39+ per cent of 996 services) is approximately that reported by the practical dairymen who have discussed this phase of the breeding problem. It should be borne in mind, however, that in any group of bulls examined in the field the owners are quite apt to request such examinations if they are having trouble, and not so apt to make such requests if there are no serious breeding difficulties.

While there was apparently a definite relation between the seminal picture and the probability of pregnancy resulting from that service, there were such large variations between the pictures on repeated examinations of the same animal that it is quite evident that the practice of passing final judgment through the examination of only one specimen should not be adopted.

Considering the results of these studies in comparison with reports in the literature of seminal examinations, it should be borne

in mind that a large percentage of such reports deal with specimens from the human. The problem of fertility in the bull is entirely different from that in the male of the human species. The physician considers the man as being fertile if only a very small percentage of the seminal specimens are capable of producing conception. On the other hand, the live stock breeder considers a bull as a satisfactory breeding animal only when a relatively high percentage of the seminal specimens are capable of producing such results.

The veterinarian should bear in mind, too, that his client calls for help relatively early if bulls being used are of low fertility. The physician, on the other hand, is frequently not consulted until several years have passed to demonstrate the low fertility or absence of fertility in the human. The veterinarian, then, in attacking the problem of low fertility in the male can, in many instances, make his clinical and microscopic examinations while the condition resulting in the low breeding efficiency is still acute. The physician in most instances does not have such opportunity.

SUMMARY

1. In this group of studies approximately 40 per cent of the bull services resulted in pregnancies.

2. There was a definite relation between the microscopic picture of the semen and the percentage of conceptions following the matings at which such specimens were collected.

3. Pregnancies sometimes, but not frequently, resulted from seminal specimens which were recorded as being distinctly below normal through microscopic examination.

4. There were marked variations in the appearances of seminal specimens from the same bull. It was impossible, therefore, to determine from a single examination what might be expected from other examinations of specimens from the same animal.

5. In the entire group of bulls which were examined more than twice each, there was no animal which always showed normal motility of the spermatozoa.

6. There was no evidence of any relation between promptness and vigor of service and either the seminal picture or the percentage of resulting pregnancies.

7. There was no relation established between frequency of coition and either pregnancies or estimated percentages of motility in bulls which were not being used excessively.

8. Measurements of spermatozoa did not prove of any value in determining the breeding efficiency of the bull.

9. Attempts at determining the hydrogen-ion concentration by both the colorimetric and electrometric methods were unsatisfactory when used on mixtures of vaginal discharges and semen.

10. The physical appearance of the mixture of vaginal discharge and semen varied very considerably in the different specimens.

Discussion

Dr. H. C. H. Kernkamp: It was very interesting to hear that you could examine the discharges or the fluids from the testicles and ducts of the bulls examined at the slaughter-house and find such a high degree of motility in the spermatozoa, and again your second paper indicated that you frequently found in the seminal ejaculations that motility was somewhat reduced. I was interested further in what you said in your conclusions, that you experienced difficulty in making satisfactory hydrogen-ion determinations of these fluids. It occurred to me that the pH of the fluids may be a factor in connection with motility.

It may be of interest to know that when making examinations of intestinal mucosa, unless one obtains the tissues immediately after death and places them in the fixing fluid, desquamation will be observed in the cells. I presume that autodigestion occurs, that the digestive juices begin to digest the mucous membranes themselves. Apparently there is nothing of that kind in the seminal vesicles or tubules. It would seem to me that if you could work out a technic whereby you could study very carefully the pH value, you might find it a factor.

Dr. C. M. Haring: I would like to ask a question. Perhaps Dr. Simms might hesitate to answer if his answer is to be inserted in the record. Perhaps he will feel free to answer the question.

First, I would say, in a preliminary way, that we probably all recognize the tremendous economic value which would result from the discovery of a satisfactory method of examining smears of semen from bulls which might be shipped long distances to the laboratory in dry conditions. I would like to ask the Chairman, if, in his opinion, the microscopic examination of smears of semen from bulls sent on glass slides by mail or otherwise to a laboratory can be of any value to the veterinarian or to the owner of the bull.

Dr. Simms: In our paper we did not state that we found a high percentage of motile spermatozoa in all our specimens. Our statement was that we found motile spermatozoa from all portions and did not find low motility associated with any gross microscopic lesions such as adhesions. We did find some specimens of low motility on the slaughter-house floor, but we could not associate those with anything we could observe on gross examination. There was only one thing we could associate very definitely and that was when we found a specimen collected from the ampulla, a thin, clear, watery fluid, there was almost always a very small number of spermatozoa, or perhaps no sperm cells at all. The motility in those that were there might be good or it might be low.

On the other hand, when we found a thick, creamy secretion in the ampulla, the number of spermatozoa was almost always large. Here again motility might be high or low. We rather considered the desquamation as being a postmortem process. We thought rather definitely that those specimens which were allowed to remain at body temperature showed more desquamation than those that were chilled immediately. It was not practical in these studies to put the material in formaldehyde immediately; they were chilled. We thought the desquamation was probably postmortem and of no consequence.

I might say our studies of pH were entirely unsatisfactory. First, we attempted it ourselves, knowing we were not chemists and not going after it with much confidence. We did not get anywhere. Then we called on men who

were supposed to be chemists to help us. They tried the colorimetric system and got nowhere. Then they tried the electrometric system and still got nowhere. We finally gave the thing up because our chemist said it was too complicated to do as a routine thing unless we had a man detailed to this one thing. We would have had to put a man on this and we did not have the money to do it.

In answer to Dr. Haring's question I would say, as far as I am concerned, I would have no confidence in the microscopic examination of dry smears or semen in regard to the fertility even if I had made the smears myself, and surely not if somebody else made the smears, a man whose technic I did not know.

I have made a number of smears in which I found no spermatozoa. Nevertheless, if I went back into the vagina and made another smear, I would find spermatozoa there. We think we have demonstrated that the separation of heads and tails of spermatozoa is very often the result of poor technic rather than the result of conditions present at the time the semen escaped.

Remember this: A high percentage of our studies have been with sperm cells collected from the genital tract rather than those discharged. The condition found in the ampulla might not be the same as found in the vagina.

I would have no confidence in mailing microscopic slides.

DR. HARING: May I ask if the way in which the heads take stains, the various aniline dyes, might not be an indication of normal or abnormal conditions?

DR. SIMMS: We have not done enough with that to reach any conclusion at all. We have seen smears in which one cell was stained deeply and another only lightly. We have seen smears of low motility in which a very considerable percentage of the cells would stain in a certain way. Our data are so incomplete we are afraid even to make a suggestion as to a conclusion that might be drawn from the type of staining. Our studies have been, in the main, of unstained materials. I think we have records on some 75 or 80 stained smears. But we cannot get much correlation out of them.

DR. J. J. FREY: Do you observe a direct and dependable relation between the motility of the sperms and the potency of the bull in the examination of live specimens?

DR. SIMMS: Usually, yes. In our percentage tables, those sperm specimens which showed low motility very infrequently resulted in conception. We must realize that these specimens had to be carried to some place for examination. In some instances they were collected in a cold barn where we did not think it practical to make an examination. Some specimens were kept for several hours, sometimes overnight in the ice-box. Some that showed low motility then might have shown high motility at the time the semen was placed in the vagina.

On the average, when we found low motility, there was small chance a pregnancy would result. When we found high motility, the probabilities were very good that there would be a pregnancy from that breeding. But as we pointed out, a single examination was no criterion of what would happen on the next examination. A bull good today might be bad tomorrow. The service today might show high motility and result in a pregnancy and there might be four, five or six services following with low motility and all fail to produce conception.

DR. FREY: Do you believe if fifteen successive examinations were made of the seminal discharge it would be a good index as to the potency of the bull and his dependability as a breeder?

DR. SIMMS: We think it would be a fairly good index, although we have examined a bull that showed average good motility of semen that had a poor breeding record. But most of the bulls that have shown high motility have been good breeders. In a considerable percentage of these studies, we did not have a very complete record of the cows being mated with the bulls. That, of course, is a factor which will make our data somewhat less reliable.

THE PROBLEM OF BANG ABORTION DISEASE IN THE SOUTH*

By M. JACOB, *Knoxville, Tenn.*

University of Tennessee

Bang abortion disease, or Bang's disease, as some now prefer to call it, presents one of the most important problems confronting the cattle-breeding industry of the South at the present time. In this the South is not alone, as every section and, in fact, every country where cattle are being raised, the disease prevails and constitutes a serious handicap to the successful operation of breeding herds.

More than the usual amount of attention of late has been centered on abortion disease due to the prevailing opinion among research and public health workers that the causative organism bears close resemblance to *Brucella melitensis*, the organism which for many years was held responsible for the occurrence of undulant or Malta fever in man. Some have taken a very positive position and have no hesitancy in stating that undulant fever in man, as it has been found in this country, is due in some cases to *Br. melitensis*, contracted as the result of drinking raw milk from infected goats, but in most instances it is attributed to the abortion germ of either porcine or bovine origin. It has resulted in a reclassification of these seemingly related organisms into the Brucella group; hence, we now refer to them either as *Br. melitensis*, *Br. abortus*, or *Br. suis*, depending upon whether the type involved is of goat, cattle or swine origin. It has also been suggested that the term brucelliasis or brucellosis be adopted to designate conditions due to infection with any organism belonging to the Brucella group. To say the least, the accumulation of evidence during the past few years has created a new and interesting problem from the standpoint of comparative medicine.

Historically, there are at least four periods bearing a significant relationship to this present-day problem. In 1887, Major Bruce, of the British Army, isolated an organism from a fatal case of Malta fever, which he called *Micrococcus melitensis*, and is now known as *Br. melitensis*. Later it was proven that people contracted the disease from drinking raw milk of goats infected with this organism. In 1897, Professor Bang, a Danish veterinarian,

*Presented at the fifteenth annual meeting of the Southern States Veterinary Medical Association, Birmingham, Alabama, January 19-20, 1931.

discovered the organism of infectious abortion in cattle. This is the well known Bang abortion bacillus, which it is now proposed to call *Br. abortus*.

In 1911, Schroeder and Cotton, of the United States Bureau of Animal Industry, found an organism in milk pathogenic to guinea pigs, which later proved to be *Br. abortus*, and definitely established the fact that infected cows may liberate the organism through the milk channels.

In 1918, Evans, of the U. S. Public Health Service, made observations from which she claimed that the organism of Malta fever and Bang abortion disease in cattle were very closely related.

In 1924, from a blood sample submitted to her for examination, obtained from a patient suffering from what appeared to be Malta fever, she isolated *Br. abortus*. There was no history of the patient having had any contact with goats or consuming any milk from this source.

Undulant Fever Presents a Problem

Since then the claim that undulant or Malta fever in man may be contracted from cattle or swine has gained considerable momentum. Even though over two thousand cases of undulant fever were definitely diagnosed in the United States in 1930, and cases having appeared in every state in the Union, there is still much to be learned regarding the inter-communicability of these infections. Public attention has been sharply focused on this problem during the past two years, largely through so-called "popular magazine articles," or the daily press. I doubt the wisdom of such efforts to enlighten, or probably I should say alarm, the public on this question at the present time. Many scientific workers are engaged in the further study of this problem and the full extent to which public health is jeopardized, as the result of human exposure to the infection of Bang abortion disease, must be determined on the basis of conclusions drawn from unmistakable scientific evidence. The fact cannot be denied, however, that the attention which has been centered on Bang abortion disease from a public health standpoint has stimulated an interest which may prove to be exceedingly helpful in our efforts to control this disease in our breeding herds. But, assuming that public health were not at stake on account of it, the problem is of sufficient economic importance to justify exerting every dependable means at our command which may lead toward its control and ultimate eradication.

Since the owner now recognizes this disease as the most serious problem with which he is confronted in the operation of his herd, it automatically becomes a problem of equal importance confronting the veterinary profession. This applies not only to the South but equally so to every other section.

We realize it is not a new disease, as it has existed in this country for many years and abortions in cattle are known to have occurred in Great Britain and on the continent at least two hundred years ago. As with other infectious diseases, dependable methods of control must be based on sound scientific principles. An enormous amount of research work with Bang abortion disease has been and is being done in this and many other countries. A realization of its importance has prompted these efforts and while there still remains the need for additional information, we are now in a better position than ever before to cope successfully with this problem in the breeding herd. The appeal for relief on the part of the constructive herd-owner is a challenge to our profession, which involves not only those engaged in research and regulatory work, but the practitioner as well.

Promiscuous Writings Confuse the Layman

The distribution of questionable literature has in many instances left an erroneous impression on the mind of the owner and it has been difficult for him to understand why his veterinarian cannot by some simple means relieve his herd of this insidious disease. It is my opinion that the first step is for the veterinarian himself to become thoroughly informed on the modern conception of the characteristics of this disease and recognized methods for its control. This then will place him in a position to give the owner or attendant the proper information when the usual run of questions is encountered. The owner must be made to realize that success in the handling of this herd to control and eradicate Bang abortion disease may require time, effort and sacrifice on his part. If he is an experienced breeder, he may not be difficult to convince, but on the other hand, if he is a beginner or has been fortunate enough to have escaped serious infection in his herd, this educational task may become extremely difficult.

With the veterinarian properly informed and a sympathetic attitude on the part of the owner, we have the basis on which will depend the success in our efforts to control and eradicate Bang abortion disease. Preliminary to recommendations for guidance in this work, it is well to review a few of the well-

established facts which should have a definite bearing on our procedure.

1. Blood samples from cattle, when properly collected, delivered to the laboratory or technician in good condition and subjected to a carefully conducted agglutination test, can be relied upon as a means of determining whether or not the animal is infected with *Br. abortus.*

2. The channel of infection under usual exposure is through the digestive tract.

3. While the bull, as a rule, plays only a minor part in the spread of this disease, yet to avoid a possible source of danger, he should be included when physical examinations and serological tests are made.

4. The principal channels of elimination of the causative organism from infected cattle are the following: (1) with uterine and vaginal discharges from cows that have recently calved or aborted; (2) from the udder with the milk of the cow; (3) with bowel discharges, especially calves, while being fed on infected cows' milk.

5. Calves from infected cows, if not exposed after four or five months old, will be free of infection by the time they are of breeding age. This offers the practical possibility of growing a clean herd from an infected herd.

6. Sterility, retained placenta, metritis and mammitis are among the frequent complications of Bang abortion disease.

7. Abortion may occur either during the first or latter half of pregnancy, but a cow may be positive to the agglutination test, yet carry and produce a normal, living calf. Such cows may be dangerous spreaders in the herd.

8. Cows negative to the abortion test, when brought into an infected herd, may readily become infected and abort. Under such conditions, seemingly dormant infections are frequently made active, as indicated by a recurrence of an abortion storm. In fact, cows positive to the agglutination test, if carrying calves normally, would be safer if additions to the herd are necessary.

9. In infected cows the organism usually becomes localized in one or all of three places, namely, the uterus, udder and adjacent lymphatic glands. *Br. abortus,* however, has not been detected in the non-gravid uterus beyond 60 days. Hence, if aborting cows are to be rebred, it should be withheld for at least 60 days, but preferably 90 days, following actual abortion.

10. *Br. abortus* may live for a considerable length of time outside of the body. Consequently, there is danger in permitting susceptible cattle to have access to anything or any place which is contaminated by discharges from diseased cattle.

In presenting this paper, it is not my purpose to offer a panacea for the problem of Bang abortion disease, applicable under any and all conditions. A plan thoroughly practical for one herd might have to be considerably modified for another. In this respect, conditions may vary in different states as they do on different farms. Control of abortion disease in the herd should be under immediate supervision and direction of a qualified veterinarian, who should study the situation and outline his plan of procedure in keeping with conditions as they exist in the herd and on the farm. As I view the situation at the present time in the South, we are primarily confronted with the problem of abortion disease under the following conditions:

1. Apparently clean herds
2. Establishing new herds
3. Lightly infected herds
4. Heavily infected herds

Apparently Clean Herds

Regarding herds referred to as apparently clean, they may be designated as such, by the fact that the calving efficiency is practically one hundred per cent. While the blood test in some of these herds might reveal some positive reactions, I doubt the wisdom of disturbing the situation beyond the recommendation that herd additions be confined to clean bulls and using additional safeguards against all other practices which might introduce virulent infection. Among these I may stress the common and pernicious practice of breeding cows from outside sources. The importance of managing the herd as a separate and distinct unit, permitting no contact with outside, especially breeding cattle, cannot be too strongly impressed upon the owner.

Establishing New Herds

During future years, probably no other section of the country will have more new breeding herds established than the South. Our grazing possibilities and the attention given to pasture-improvement in order that live stock, especially cattle, may be grown more economically and with convincing evidence already at hand are destined to bring about an expansion in the distribution of breeding herds in this territory. If the veterinarian is

consulted when new herds are to be established, he has his best opportunity to render a service that will ultimately command the greatest appreciation. Without any exception, when new breeding herds of cattle are to be established, the prospective breeder should be advised to select and accept cattle subject to a negative reaction to the agglutination test for *Br. abortus*.

Of course, where the animal must be moved across state lines, regulatory restrictions automatically provide some protection, but on the other hand, we disregard a menace equally as great if the movement is interstate. Incidentally, I am wondering if such regulations are justified covering interstate movements, would it not be equally important to extend such restrictions on all cattle when changing hands for dairy and breeding purposes? If the barns and premises for the new herd have been previously occupied by cattle, such barns and premises should be thoroughly cleaned and disinfected before being used to house the new cattle. Transportation of the cattle should be under minimum exposure. Cows or heifers close to calving, even though negative to the blood test, had best be held in isolation until after the calf is born. If normal and no complications arise, she may then be added to the herd. After the herd has been established, a retest of the blood, in 60 to 90 days, of all cattle in the herd is advisable. If again 100 per cent negative, the policy of an annual test should be adopted, unless for obvious reasons earlier and more frequent tests appear necessary.

When once the herd has been established of sufficient proportions, it is then advisable to rely on new, clean bulls for the addition of new blood. If females must be added it had best be limited to the addition of open heifers which are negative to the agglutination test for *Br. abortus*. Here too the iron-clad rule of avoiding practices tending toward exposure from outside sources should be followed in order that the status of abortion-free be maintained in the herd.

Lightly Infected Herds

If a blood test reveals only a small percentage of cattle in the herd infected, it is most economical to eliminate the reactors from the farm and maintain only a clean unit. In the case of valuable purebred cattle, it may, under certain conditions, be justified to hold the small group of positive-reacting animals on different premises pending final disposition. I have had the experience of having an additional number of cattle to react

when a subsequent test of the initial negatives was made 60 to 90 days later, so that in reality the herd was now one belonging to the heavy rather than the lightly infected class and it would then be more practical to handle the situation on a basis as will be pointed out later. Such a history is especially common in herds where abortions have been of recent occurrence. Had the owner been persuaded to dispose of the few original reactors and which may have been his best cattle, the sympathy of his attitude would be severely taxed. It therefore resolves itself to the importance of at least two blood tests before concluding that the herd is one of light infection and to be handled as such. Assuming now that the herd does belong to the lightly infected class, the owner, when once he has had the opportunity of enjoying the milk production and breeding efficiency of his clean herd, will not tolerate, for a very long period of time, maintaining a few infected cows either on his own or another farm.

Heavily Infected Herds

If the initial blood test reveals a large percentage of positive cows in the herd, a different problem presents itself. For example, if the herd included 40 animals of breeding age and 50 per cent were found to be infected, there are comparatively few breeders in the South who would adopt a recommendation to dispose of the reacting part of the herd completely, especially if they are good producers, as is frequently the case. Nor would such a recommendation be wholly practical at the beginning. Under this condition, dividing the herd into two separate units, one the negative or clean and the other the positive or infected, would at this time be the practical plan to adopt. Where the owner has more than one farm, it is not difficult to carry out the two-unit plan. If only the one farm is available, the plan of procedure should depend considerably upon the equipment. Many of our breeding and dairy farms are not provided with sufficient barn space or well divided pastures to simplify the two-unit system. In fact the picture at first might seem extremely discouraging. But, nevertheless, on many of these same farms it is possible to carry out at least a modification of the ideal plan, by which we are able to accomplish a great deal toward the desired goal, that of an abortion-free herd.

The fact that it is possible to milk or feed with safety both a clean and an infected herd in the same barn, provided each group is driven separately into and out of the barn and are not per-

mitted to occupy the same stalls, frequently simplifies our problem. The barn, of course, must be sanitary and disinfected at regular intervals. In addition, separate pastures, shed room and calvng-stalls should be provided for each unit. Calves born from the infected cows, if desired, may be nursed or pail-fed in the infected herd, but when they are 4 or 5 months old and milk-feeding has been discontinued, they should be moved, after an interval of two weeks, to the premises occupied by the clean herd. When a cow proves to be unproductive, she should be sent to the butcher, which, when adhered to, will rapidly reduce the number of animals in the reacting unit. All cattle in the clean unit should be retested as suggested for the newly established abortion-free herd and any showing a positive reaction should be transferred to the infected unit. While separate bulls for each unit are desirable, yet it is not absolutely essential as long as the bull remains negative to the agglutination test and the precaution is taken of disinfecting the skin over the abdominal wall and sheath after each service. All attendants or caretakers must be cautioned from time to time so as to avoid overlooking or breaking established herd management rules.

Agglutination Test a Powerful Aid

From what I have stated, it should be apparent that major dependence is placed on the intelligent use of the agglutination test. It is our most dependable means of detecting the animal carrying and spreading the disease-producing organism. To assume that we can build up abortion-free herds by permitting the unrestricted intermingling of clean and infected cattle is not in harmony with the fundamental principles of preventive medicine.

There has been some effort made urging the practicing veterinarian to take advantage of the more or less newly perfected rapid method of applying the agglutination test for Bang abortion infection. I seriously doubt the widsom of the practitioner, at this time, assuming such a responsibility. It is logical that he should be familiar with the technic but I consider the test a highly technical piece of work, which must be carefully conducted and properly interpreted. Check tests by the long or tube method may be necessary in some instances in order to arrive at a definite conclusion. Even admitting that there are many instances where a rapid test made by the practitioner will serve an immediate purpose, yet until the test becomes more fool-

proof, I am in favor of continuing to delegate this service to the trained laboratory worker.

Comparatively little has been done in the South, up to the present time, in the way of a concerted effort to control Bang abortion disease. This has not been the fault of the veterinary profession. There has been too great a tendency for the cattle-owner to travel the path of least resistance and he was not willing to assume his, the major part, of the responsibility. Lack of experience in the cattle-breeding business may offer a charitable explanation in many cases. In Tennessee, which is a selling rather than a buying state, our breeders are beginning to realize that they are now confronted with certain obstacles which limit their possibilities, unless they can be overcome.

State Sanitary Regulations

Many states now prohibit the entrance of dairy or breeding cattle unless they have given a negative reaction to a recent application of the agglutination test. No less than 20 states are already enforcing such a regulation, with a likelihood that others will follow. Then, too, the intelligent buyer will hesitate to make selections out of herds which do not show a normal calf crop. In other words, the present-day dairy and breeding cattle market is developing on the basis of "clean cattle out of clean herds." The owner realizes, too, that his infected herd has fallen short in both calf and milk production. His herd ceases to be profitable and, as a result, many promising breeders have lost interest and discontinued the original plan of establishing a creditable breeding herd. To state the situation bluntly, Bang abortion disease has put more breeders and dairymen out of business than any other one thing.

I am sure all of you are familiar with such occurrences in your respective localities. Finally, if the present trend of thought regarding the relationship of *Br. abortus* to undulant fever in man is further substantiated, the dairymen will become obligated to meet public health requirements in their aim to minimize the occurrence of this disease through the milk supply. Careful consideration of these various obstacles should emphasize the fact that, in reality, the breeder or dairyman, if he hopes to succeed, has no alternative other than that of adopting, as a part of his herd management program, a sound plan for the control and eradication of Bang abortion disease. This work should be under the direction of his veterinarian, who by right

of his professional training is logically equipped to advise the owner and handle the complicating problems frequently associated with the presence of this infection.

It may at first appear to the owner that he is neither financially or otherwise able to carry out the provisions of the previously outlined control plans, when as a matter of fact the expense of maintaining a badly infected herd overshadows the actual cost incident to a sound plan for its control. The time may come when we will have the advantage of being able to establish dependable, artificial immunity, which of course would materially change our control program. Personally, I am somewhat hopeful that this will ultimately be accomplished.

Recognizing Bang abortion disease as a problem of vast economic importance, its presence or absence will determine very largely the final outcome of our cattle business as far as the breeder is concerned. As already stated, the South has potential possibilities in the cattle business, especially on the small breeding herd basis. It is a factor in the solution of southern agriculture, which the veterinary profession must help to solve.

Postoffice, Kansas City, Missouri

INFECTIVITY OF THE CELLS OF HOG CHOLERA BLOOD*

By WILLY RUCKS† *and* CHAS. MURRAY

Department of Veterinary Investigation
Iowa State College, Ames, Iowa

Duval,[1] in an article entitled, "Observations upon the Nature of the Virus of Hog Cholera," states:

> It has been determined by animal experiment that the virus of hog cholera at no period during the infection is intracellular, in so far as the blood cells are concerned. Repeated injections into young non-immune hogs of large quantities of the freshly washed blood cells have failed to infect. Therefore, it is highly advantageous in working with the virus to eliminate the cellular elements of the blood and use only the serum since the cells are worthless from the standpoint of virus.

The literature bearing upon this property of the cells of hog cholera blood does not indicate that any one, other than Duval, has had results in accord with his observations. That the blood of animals sick of hog cholera contains the infective agent and that this agent belongs to the group of filtrable viruses was demonstrated by de Schweinitz and Dorset in 1903[2] and this important fact served as the fundamental basis for the system of immunization developed by Dorset, Niles and McBryde,[3] up to the present the only known method of controlling hog cholera. Their work established the fact that virus was present in the fluid portion of the blood, since their very early experiments, which proved the filtrability of the virus, made use of the blood serum, diluted and filtered. They did not at that time, however, demonstrate whether the virus was contained in the cellular elements of the blood, a matter of no importance from an immunological standpoint, since the vaccinated hog received the whole defibrinated blood.

Later unpublished data of these investigators show that in numerous experiments they have found that the washed cells of hog cholera blood are infective and in a private communication Dr. Dorset has stated it to be his opinion that the cells are more infective than the fluid portion of the blood, and that examination of their earlier work indicates rather clearly that the disease set up by the whole blood was, in general, more acute and more fatal than the disease produced by the filtered serum, resulting possibly

*Received for publication, February 2, 1931.
†Graduate fellow, Department of Veterinary Investigation, Iowa State College, 1930.

from the difference in dose, which was increased in the case of whole blood containing the virus attached to the cells as well as that free in the serum.

In 1912, Dinwiddie[4] reached the conclusion that the virus of hog cholera blood is contained principally in the blood cells, but that it also occurs in the serum or plasma by whatever mode these are obtained and that in shed blood it escapes from the corpuscles into the surrounding fluid, either with or without hemolysis. He proved by his experiments that, although the blood cells as well as the serum could produce the disease, the virus must have been attached to or contained in the blood cells, since after several washings with physiologic salt solution he could always produce the disease by their injection. However, the virus could be released from the cells, as he proved by injecting serum separated from all the cells by centrifugation and filtration.

Roderick and Schalk,[5] in 1927, performed experiments similar to those of Dinwiddie and found that the erythrocytes carried the virus even after nine washings in salt solution. In one of their experiments, erythrocytes of a normal hog were washed with salt solution, after which virulent serum was mixed in the proportion of 1 part of serum to 2 parts of erythrocytes and kept in the ice-box one night and in the incubator for 2 hours. The mixture was then centrifugalized and the cells were washed in salt solution 8 times, after which 2 cc of cells was suspended in 5 cc of salt solution and injected into 2 pigs. Both animals showed symptoms and lesions of hog cholera. They therefore assume that the erythrocytes adsorb or carry the virus and question the statement of Dinwiddie that the virus is rather intracorpuscular. They admit, however, that it may penetrate the normal erythrocytes and that it seems very difficult to remove this virus completely when attached to those cells, because there always remain traces capable of causing the infection.

Steyn[6] describes a South African disease in pigs resembling European swine fever. He states that the disease is caused by a filtrable virus but that injection of unhemolyzed blood from sick pigs did not cause death, but only fever. On the other hand, when filtered hemolyzed blood was used, the injected pigs died with the typical lesions of the disease. He concludes from this that the virus must have been largely attached to the blood cells, although he admits that more investigation should be made before expressing a definite opinion on the matter. A disease similar to this was studied also by Montgomery,[7] in East Africa, and by an

English Committee, which reached the conclusion that, according to their experiments, the virus was intimately connected with the red blood cells. Although these diseases are probably not identical with hog cholera, the fact of their similarity in symptoms and lesions and in their virus origin warrants their consideration as bearing upon the relationship of hog cholera virus to the blood cells.

It was desirable in our experiments to have a potent virus and, after testing several, that furnished by the Experiment Station of the Bureau of Animal Industry at Ames was found satisfactory. The animals used in these experiments were from immune dams and were raised upon grounds of the Veterinary Investigation farm where hog cholera had not occurred for the past ten years. Several wooden sheds with concrete floors were distributed conveniently about 300 yards from the buildings and pens of other animals, in order to control infection and to prevent the possible spread of other diseases to the test pigs. They were thoroughly washed and disinfected several days before being used. Separate equipment used for feeding and cleaning and individual thermometers for taking temperatures were supplied the various houses to avoid any possible transmission of infection from shed to shed. Intraperitoneal injections were made throughout the experiment.

Pig 4 (see table I) was injected with 5 cc of the B. A. I. virus and was destroyed on the seventh day. Typical symptoms of hog cholera were manifested and lesions upon autopsy indicated an acute type of hog cholera. The blood from this pig was used as a source of both serum and corpuscles for the injection of pigs 5 and 6, used in the first experiment. The technic for obtaining serum-free cells was as follows:

> Five cc of defibrinated virus blood was placed in a 15-cc centrifuge-tube and centrifuged for 10 minutes at 1400 revolutions per minute to separate the serum from the cells. About 2.5 cc of serum was collected and kept for injection and about 2.5 cc of cells was left in the tube from which 1 cc was removed for washing. To the latter was added 14 cc of physiologic salt solution (0.85 per cent NaCl), making a dilution of 1:15. This suspension was carefully and gently shaken, so that the cells would be bathed with the salt solution but not injured to cause hemolysis. After centrifugation for 10 minutes, at a speed of 1400 revolutions per minute, the salt solution was withdrawn with a fine pipette connected with the vacuum pump.
>
> The separation of fluid from cells was so complete that not to exceed 0.1 cc of the salt solution remained. Six washings were performed whereby the final dilution of virus-serum, assuming 1 cc remaining after each washing, would be such (15^6 = 11,390,625) that it would be beyond the possibility of infectivity which has been shown by various investigators to be somewhere near 1/500,000 cc. Thus any infectivity of the material injected would seem to rest in the cells rather than in any attached serum.

TABLE I—*Data on 11 pigs used in experiments*

PIG	INJECTED	MAXIMUM TEMPERATURE	KILLED	SYMPTOMS	CHOLERA LESIONS	OTHER LESIONS
4	5 cc B. A. I. whole blood virus	107 (5th day)	7th day	Marked	Marked	None
5	2.5 cc serum from pig 4	106.2 (7th day)	12th day	Good	Good	None
6	1 cc cells from pig 4. Washed 6 times	106 (4th day)	8th day	Marked	Marked	Slight pneumonia
9	2.5 cc serum from pig 6	106.2 (4th day)	10th day	Good	Slight	Slight pneumonia-verminous
10	1 cc cells from pig 6. Washed 8 times	107 (5th day)	10th day	Marked	Marked	Slight pneumonia-verminous
13	2.5 cc serum from pig 9. Filtered through Berkefeld	107.2 (8th day)	8th day	Marked	Moderate	None
12	1 cc cells from pig 9. Washed 8 times. Hemolyzed and filtered through Berkefeld	107 (4th day)	9th day (died)	Marked	Marked	None
27	2.5 cc serum from pig 13. Filtered through Berkefeld	104 (4th day)	9th day (died)	Marked	Marked	Penumonia-verminous
28	1 cc cells from pig 13. Washed 8 times. Hemolyzed and filtered through Berkefeld	104.6 (5th day)	9th day	Marked	Marked	None
35	1 cc cells from pig 28. Washed 16 times	105.6 (5th day)	9th day	Marked	Marked	None
36	1 cc cells from pig 28. Washed 16 times. Hemolyzed. Filtered through Berkefeld	105.8 (6th day)	8th day	Marked	Marked	None

After a period of 24 hours, the 1 cc of washed cells was suspended in 4 cc of physiologic salt solution and injected into the peritoneal cavity of pig 6. Pig 5 received an injection into the peritoneal cavity of 2.5 cc of the serum separated from the 5 cc of defibrinated blood. These two pigs weighed 40 pounds each and were kept in separate sheds and every precaution was taken to avoid any possible contamination from shed to shed. Both animals when injected were in good health and showed a temperature of 103°F. They were carefully watched and temperature and symptoms were recorded daily.

Experiment I

Pig 6, injected with 1 cc of the washed blood cells from pig 4, showed very early symptoms of cholera, beginning with loss of appetite on the second day and a temperature of 105.4°F. Typical symptoms continued until it became moribund on the eighth day, when it was killed (see table I). The pathologic changes noted on autopsy include congestion of all lymph-glands, petechiation of the kidneys and bladder, enlargement and congestion of the spleen and ecchymoses of the lungs.

Table II—*Clinical record of pig 6*

Date	Temperature (Degrees Fahrenheit)	Remarks
October 22	103.0	Injected 1 cc blood cells in 4 cc physiologic salt
October 23	105.8	Good appetite
October 24	105.8	Sluggish; no appetite
October 25	106.0	
October 27	103.8	Nervous attacks; jerking gait; no appetite
October 28	104.0	Weepy eyes; jerking gait
October 29	102.0	Killed

Pig 5, which had been injected with 2.5 cc of virus-serum from pig 4, was killed on the thirteenth day. The effect of the virus was slower on this pig than that of the washed cells on pig 6 (see table I) and the symptoms and lesions of cholera were less marked but sufficient to warrant a diagnosis of cholera. Apparently the virus in 1 cc of the washed cells was more potent than that in 2.5 cc of serum, although the latter represents more than double the proportion of the original whole blood from which each was obtained.

Experiment II

In the second experiment, 5 cc of the blood collected from pig 6, which had been injected with the washed blood cells, was centrifuged to separate the serum from the cells. About 2.5 cc of serum was again obtained and kept to inoculate a pig. One

TABLE III—*Clinical record of pig 5*

DATE	TEMPERATURE (DEGREES FAHRENHEIT)	REMARKS
October 22	103.0	Injected 2.5 cc virus-serum
October 23	103.6	
October 24	104.4	Some appetite; sluggish
October 25	105.8	
October 27	105.4	Sluggish
October 28	106.2	No appetite
October 29	106.4	
October 30	105.8	Jerking gait; no appetite
October 31	106.2	Cough
November 1	105.2	
November 3	103.0	Killed

cc of blood cells separated from the serum was washed 8 times in 14 cc of physiologic salt solution at the same speed and time in centrifugation as in the former experiment. The 1 cc of washed blood cells was suspended in 4 cc of physiologic salt solution and injected into the peritoneal cavity of pig 10 and the 2.5 cc of serum into the peritoneal cavity of pig 9 (see table I). Both were in good health and condition, weighing 40 pounds. Early after injection, pig 10 reacted with high temperatures, as shown in the accompanying table. A cough developed and persisted until death. It was sluggish after the second day and 6 days after being inoculated nervous disturbances appeared, manifested by jerking. A striking dyspnea was evident during the last few days of life.

All the lymph-glands were slightly enlarged and markedly congested, showing petechiae principally on the periphery. The kidneys were mottled with petechiae throughout the cortical and internal structure. Petechiae were found also in the pelvis renalis. The mucosa of the bladder showed well marked and circumscribed petechiae over the entire surface. The cecum and colon showed many petechiae but no lesions were seen on the small intestines. Many petechiae were found over the mucosa of the stomach. The liver showed areas of congestion not well delimited on its surface and was normal in size. The spleen showed very small petechiae. On the surface of the lungs petechiae and ecchymoses were present varying in size. Areas of pneumonia containing lung worms were found near the border. The epiglottis showed well marked petechiae on the mucosa.

Pig 9, injected with the virus-serum, was killed 9 days after injection, very sick and with a temperature of 101.6°F. Its blood

TABLE IV—*Clinical record of pig 10*

DATE	TEMPERATURE (DEGREES FAHRENHEIT)	REMARKS
October 31	103.6	Injected 1 cc blood cells in 4 cc physiologic salt
November 1	104.2	
November 3	106.2	Cough
November 4	106.2	Sluggish
November 5	107.0	
November 6	105.4	Jerking gait
November 7	105.2	
November 8	105.8	Dyspnea
November 10	96.4	Very weak; dyspnea

was collected aseptically in a sterile jar and defibrinated by shaking, to be used in the next experiment. Autopsy showed all lymph-glands slightly enlarged but not congested with the exception of the thoracic. In the abdominal cavity the omentum had adhesions with the abdominal wall, the result of an old chronic peritonitis. A few petechiae were observed on the periphery and internal structure of the kidneys as well as on the bladder. The cecum and colon had some petechiae scattered over the surface. No appreciable macroscopic changes were apparent in the mesenteric lymph-glands except that they were slightly enlarged, but not congested. The stomach showed some areas of inflammation. The liver was somewhat enlarged and firm. The spleen was normal in size with a few small petechiae on its surface. Some areas of pneumonia were found caused by lung worms.

In this second experiment, in spite of the fact that the blood cells had been washed 8 times, the pig injected with them reacted with a higher temperature than the pig receiving virus-serum and sickened more rapidly, so that by the tenth day it was moribund, with a temperature of 94.6°F. It is also interesting to note that the lesions which are considered diagnostic of hog cholera were more abundant and more pronounced.

EXPERIMENT III

The blood collected from pig 9, which was injected with the virus-serum, was defibrinated by shaking and 5 cc of this was placed in a 15-cc centrifuge-tube and centrifuged for 10 minutes at a speed of 1400 revolutions per minute, to separate the serum from the blood cells. About 2.5 cc of serum was obtained and was filtered through a Berkefeld filter with 30 pounds vacuum.

TABLE V—*Clinical record of pig 9*

DATE	TEMPERATURE (DEGREES FAHRENHEIT)	REMARKS
October 31	103.0	Injected 2.5 cc virus-serum
November 1	104.6	
November 3	106.2	
November 4	105.4	Sluggish
November 5	105.0	No appetite
November 6	105.4	
November 7	106.2	Weakness; jerking gait
November 8	105.0	
November 10	101.6	Killed

Culture tests of this serum proved it was sterile after the whole blood had been kept for 2 days in the ice-box to favor sedimentation of the blood cells. This 2.5 cc of filtered serum, free from all blood cells, was injected into the peritoneal cavity of pig 13, weight 50 pounds, healthy and in good condition. One cc of the blood cells was added to 14 cc of physiologic salt solution (0.85 per cent NaCl) and washed 8 times. These washed blood cells were then added to 14 cc of distilled water for 4 hours to produce hemolysis, thus freeing the virus if any were contained in the cells. This water containing the products of the hemolyzed cells was then filtered through paper pulp, to remove the stroma and débris of the cells, and then passed through a Berkefeld candle under 30 pounds vacuum. A sample was cultured and proved sterile after incubation for 12 hours. Twelve hours later, this was injected into the peritoneal cavity of pig 12, weight 40 pounds and in good health. A soft cough was observed 2 days after the injection and its appetite was diminished. It became

TABLE VI—*Clinical record of pig 12*

DATE	TEMPERATURE (DEGREES FAHRENHEIT)	REMARKS
November 12	104.4	Injected 1 cc filtered hemolyzed blood cells
November 13	105.4	
November 14	106.6	Cough; no appetite
November 15	107.0	
November 17	107.0	Sluggish; cough
November 18	106.8	
November 19	105.2	Extreme weakness; dyspnea
November 20		Dead

sluggish and its cough persisted until death. Extreme weakness and marked dyspnea were apparent before death. It was found dead the ninth day after injection, having shown very striking symptoms, and upon autopsy very characteristic lesions of hog cholera (see table VI).

Pig 13 was killed on the eighth day after injection with the filtered virus-serum from pig 9. Moderate lesions of cholera were found, much less marked than those of pig 12.

TABLE VII—*Clinical record of pig 13*

DATE	TEMPERATURE (DEGREES FAHRENHEIT)	REMARKS
November 13	102.6	Injected 2.5 cc filtered virus-serum
November 14	105.0	
November 15	105.0	Sluggish
November 17	105.6	No appetite
November 18	105.0	
November 19	104.6	Cough
November 20	107.2	Killed

In this experiment not only the symptoms but also the lesions were less severe in the pig injected with the filtered serum, free from blood cells, than in the one injected with the filtered hemolyzed blood cells, further confirming the evidence that the virus content of the blood cells surpasses that of the serum. A check on this experiment was carried out using the blood from pig 13 injected with virus-serum.

EXPERIMENT IV

The same technic as used in experiment III was followed in preparing the serum and blood cells for this check experiment.

TABLE VIII—*Clinical record of pig 27*

DATE	TEMPERATURE (DEGREES FAHRENHEIT)	REMARKS
November 24	102.4	Injected 2.5 cc filtered virus-serum
November 25	103.4	
November 26	102.6	
November 27	104.0	Sluggish
November 28	103.0	Soft cough; no appetite
November 29	103.2	
November 30	103.0	
December 1	102.8	Weakness
December 2		Found dead

Two and one-half cc of filtered serum was injected into pig 27 and 1 cc of cells, hemolyzed and filtered, into pig 28. These two pigs were kept in separate sheds, well cleaned and disinfected before they were used.

Pig 27 did not show high temperatures at any time but its appetite diminished and it became sluggish by the fifth day. It died the ninth day. The lesions observed on autopsy were characteristically those of cholera and extensive.

Pig 28 was destroyed the tenth day after injection. It manifested characteristic symptoms of hog cholera, a delayed high temperature and marked lesions. If judgment based on manifestations of cholera were offered regarding these two pigs, it would be that pig 28, receiving the hemolyzed, filtered cells, was more severely affected than pig 27, receiving filtered serum.

TABLE IX—*Clinical record of pig 28*

DATE	TEMPERATURE (DEGREES FAHRENHEIT)	REMARKS
November 24	102.4	Injected 1 cc filtered hemolyzed blood cells
November 25	104.8	
November 26	104.4	
November 27	104.0	Sluggish
November 28	104.6	No appetite
November 29	104.2	
November 30	104.4	Weepy eyes
December 1	104.0	
December 2	106.0	Weakness; cough Killed

EXPERIMENT V

One further experiment was conducted, using washed blood cells and filtered hemolyzed cells, but increasing the number of washings to 16, in order more certainly to eliminate the possibility of the virus being carried over in the attached serum, from washing to washing. One cc of the blood cells after the sixteenth washing was suspended in 4 cc of physiologic salt solution and injected into the peritoneal cavity of pig 35. Another 1 cc was placed in 14 cc of distilled water for 4 hours until hemolyzed, then filtered through paper pulp and afterwards through a Berkefeld candle under 30 pounds vacuum. This was injected into the peritoneal cavity of pig 36. Both pigs were healthy, weighed 60 pounds and possessed normal temperatures at time of injection (see tables VIII and IX). They were kept in separate

houses that had been cleaned and disinfected just prior to their use. Pig 36, receiving the filtered cell products, responded with high temperature on the third day, one day sooner than pig 35, receiving the washed, unhemolyzed cells. Both pigs at autopsy showed well-marked lesions of hog cholera.

TABLE X—*Clinical record of pig 36*

DATE	TEMPERATURE (DEGREES FAHRENHEIT)	REMARKS
December 5	103.0	Injected 1 cc hemolyzed filtered blood cells
December 6	101.6	
December 7	102.8	
December 8	101.4	Sluggish
December 9	105.6	No appetite
December 10	105.9	Cough
December 11	103.6	
December 12	103.4	Killed

TABLE XI—*Clinical record of pig 35*

DATE	TEMPERATURE (DEGREES FAHRENHEIT)	REMARKS
December 5	102.6	Injected 1 cc suspension of blood cells washed 16 times
December 6	102.6	
December 7	103.8	
December 8	103.2	Sluggish
December 9	105.6	
December 10	105.0	No appetite
December 11	105.0	Cough
December 12	105.6	
December 13	105.0	Killed

SUMMARY

A series of five experiments has been conducted to determine whether the cells of hog cholera blood are infective and possess pathogenic properties after separation from the serum and repeated washings with physiologic salt solution. The results of these experiments clearly demonstrate that the cells are highly infective after 6, 8 and 16 washings, whereby practically all virus is removed or is so diluted by the washings that it is beyond the possibility of infectivity. The virus contained in the cells, released by hemolysis and then filtered through Berkefeld candles,

possessed sufficient virulence to produce typical hog cholera when injected in minute dosage into susceptible pigs.

REFERENCES

[1]Duval, Charles W.: Observations upon the nature of the virus of hog cholera. Proc. Soc. Exp. Biol. & Med., xxvii (1929), 2.
[2]de Schweinitz, E. A., and Dorset, M.: A form of hog cholera not caused by the hog cholera bacillus. U. S. B. A. I. Cir. 41 (1903).
[3]Dorset, M., McBryde, C. N., and Niles, W. B.: Further experiments concerning the production of immunity from hog cholera. U. S. B. A. I. Bul. 102 (1908).
[4]Dinwiddie, R.: The infectiousness of serum and serum-free blood corpuscles in hog cholera. Ark. Agr. Exp. Sta. Bul. 111 (1912).
[5]Roderick, L. M., and Schalk, A. F.: Collected studies on hog cholera. N. Dak. Agr. Exp. Sta. Bul. 210 (1927).
[6]Steyn, D. G.: 13th & 14th Rpts. Dept. Agr., Union of South Africa (1928), part 1, p. 415.
[7]Montgomery, C. G.: 13th & 14th Rpts. Dept. Agr., Union of South Africa (1928), part 1, p. 419.

Florida Pushes Tick Eradication

Florida has taken another step forward toward the eradication of the cattle-fever tick within its borders. Nine counties of the central part of the State are engaged in a tick-clean-up campaign, which opened March 16. The area involved consists of Citrus, Sumter, Lake, Orange, Seminole, Brevard and Indian River counties, and parts of St. Lucie and Osceola counties.

At a monthly meeting of the State Live Stock Sanitary Board, at Jacksonville, recently, plans matured for an aggressive and systematic dipping campaign to hasten the final eradication of cattle ticks from Florida. The action of the state officials parallels and supports the efforts of the federal Bureau of Animal Industry to stamp out this pest.

On July 1, 1906, the date of beginning systematic tick eradication in the United States, the entire state of Florida (67 counties) was under ban. This was an area of 54,861 square miles. On December 1, 1930, the number of counties still under quarantine was 31, about 49 per cent of the State's area. The expected early success of tick eradication in the nine counties now undertaking the work will further reduce the serious loss which ticks impose on the live stock industry, officials of the U. S. Department of Agriculture say.

Oklahomans to Meet at Stillwater

Oklahoma veterinarians are looking forward to the semi-annual meeting of the Oklahoma Veterinary Medical Association which will be held in conjunction with a short course for graduate veterinarians at the A. & M. College, at Stillwater, June 15-16-17. Secretary Fauks announces a comprehensive program, designed primarily for the practitioner, with everything from parasites to poisonous plants.

PROPHYLACTIC VACCINATION OF DOGS AGAINST RABIES*

By H. W. SCHOENING, *Washington, D. C.*

Pathological Division, Bureau of Animal Industry,

U. S. Department of Agriculture

No one can question the soundness of the principles which embody the use of the prophylactic vaccination of dogs in the control of rabies, when used in conjunction with other standard control measures vigorously enforced; provided that the vaccine used is one that is absolutely safe and one that induces a high degree of immunity that persists for a reasonable length of time. In other words, the practical application of prophylactic vaccination hinges on the effectiveness of the vaccine. Since the introduction of the Japanese vaccine in this country in 1922, by Eichhorn and Lyon,[1] certain changes in the manufacture of the vaccine have taken place following its extended use in the field and it seems desirable at this time to attempt an evaluation of the vaccines that are now in use in this country.

The original vaccine of Umeno and Doi[2] was a fixed-virus vaccine attenuated by phenol and contained 20 per cent of brain tissue. It was found that this vaccine at times contained living virus and could produce rabies when injected subcutaneously in dogs. As this is highly objectionable in a prophylactic vaccine, its use was discontinued and its place taken in recent years by vaccines killed by chemicals or rendered avirulent to such an extent as to be incapable of producing the disease when given the most severe test, *i. e.*, subdural injection into rabbits.

In the United States, at the present time, two types of prophylactic vaccine are prepared commercially. One is a phenol-treated vaccine and the other chloroform-treated, both of which are either killed or are avirulent to such an extent that they do not produce the disease when injected subdurally into rabbits. It has been held in some quarters that a dead virus has no immunizing properties and that a vaccine containing a dead virus is impotent. Animal inoculation, however, is the only test for viability now available and until new methods are at hand a differentiation cannot be made between a virus that is dead and one that has been rendered completely avirulent but is still living.

* Presented at the meeting of the Hudson Valley Veterinary Medical Society, Albany, N. Y., February 11, 1931.

The phenol-treated vaccines contain from 10 to 20 per cent of brain tissue, while the chloroform vaccine contains 33 1/3 per cent of brain material. An attempt will be made to evaluate these two vaccines from the available data. In evaluating a vaccine the points to be considered are: 1. Does it immunize? 2. Is it safe? 3. How long does immunity last?

Does it Immunize?

Experimental tests made by the writer in 1928-29, on dogs,[4] showed that of 12 dogs treated with the phenol vaccine and later exposed to rabies street virus by intramuscular injection, 5 (about 42 per cent) died of rabies, while of 11 control dogs 9 (about 82 per cent) contracted rabies, a decided difference in favor of the vaccinated dogs. In these tests it was noted also that deaths of the vaccinated dogs occurred among those animals treated with certain lots of vaccine. In other words, while the number of cases was small, there appeared to be a difference in potency in lots of vaccine prepared in the same manner. It would seem then that phenol vaccines in general are capable of producing a reasonable degree of immunity in dogs, but that failures of the vaccine are to be expected at times.

Of practical importance in the field use of the vaccine is the question of the plurality of types of the virus of rabies. Are there types (or a type) of a virus that are immunologically different? The fixed virus from which vaccines are made in this country is a single strain, found on inquiry, some years ago, to have had its origin in the Pasteur Institute of Paris, France. Do types of street virus exist against which the vaccines made from the standard fixed virus cannot immunize? It is an accepted fact that there is a marked variation in the virulence of different strains of rabies virus, and while the unity of rabies virus is generally held, suggestive evidence has been presented at times to indicate the possibility of the existence of more than one type of the virus.[5]

The writer encountered a strain of virus several years ago against which apparently little immunity in dogs could be produced. This virus has been studied in the laboratory and possesses a marked characteristic not seen in other strains of street virus. This is the amazingly great number of Negri bodies regularly found in smear preparations from the hippocampus. This characteristic has been preserved over a period of years and

after a large number of passages in the rabbit. Further immunity studies with this strain are contemplated.

Failures of the vaccine in the field have been noted. These can be explained on the basis of the failure of the vaccine to induce an immunity in the animal or to exposure to a type of street virus immunologically different from the standard fixed virus. Until concrete proof has been produced experimentally as to the plurality of the rabies virus, this question must remain unsettled.

Experimental work on the potency of chloroform-treated vaccines has been highly encouraging. Experimental work conducted in 1929[4] showed that of nine dogs treated with this type of vaccine, all survived exposure to a street virus, injected intramuscularly, which was sufficiently virulent to cause rabies to develop in 11 out of 13 control dogs. This product has only recently been placed on the market commercially and no data are available on its efficacy under field conditions. Recent work by Kelser with the chloroform-treated vaccine showed a high degree of potency for this product when tested on rabbits.[6]

Is the Vaccine Safe?

The phenol-killed vaccine, if prepared properly, is incapable of producing rabies in itself, as it must be shown, before release, not to contain virus capable of producing the disease on subdural injection in rabbits. However, there is a certain element of danger, following vaccination, that should be recognized. This is a paralysis somewhat similar to that seen occasionally in man following antirabic treatment. In man it has been noted that paralysis is less apt to occur when vaccines are used, which have been attenuated or killed by phenol. It is believed probable from the number of cases reported experimentally[5] that the dog is more susceptible to vaccination paralysis than man, although exact figures are lacking. Most of the cases of paralysis appear within from a few days to several weeks after vaccination and in the majority of cases result in complete recovery, although the termination may be fatal. Cases of paralysis have been noted in experimental work and also following field use of vaccine.

The chloroform-treated vaccine, like the phenol-treated, if prepared properly, can not produce rabies. Experimentally, no cases of paralysis have been observed in 30 dogs vaccinated with this product by the writer.

The vaccine has been used to date on approximately 150 dogs at one army post with no unfavorable reactions as a result of the

injection. Just how this vaccine will act under field conditions remains to be seen.

There is a possibility that vaccination may produce, for a short period after vaccination, a temporary negative phase during which a dog may be more susceptible to infection than one not vaccinated. This was suggested by limited experimental work reported by the writer in 1928.[7] It would appear to be a safe procedure to keep vaccinated dogs in quarantine for a limited period of two or three weeks, to observe the effects of vaccination, and to keep them from possible exposure until immunity has had a chance to assert itself.

How Long Does Immunity Last?

Experimental data have been presented by several workers to indicate that the original Japanese vaccine induced immunity that persisted from some months to one year, and that immunity was apparent after one month. Experimental data on this point in respect to phenol-killed vaccines are quite meager.

The writer encountered one dog which resisted infection one year after vaccination with a phenol-killed product.

Immunity should not be considered in any event to last more than one year and in some cases it may endure for a shorter time.

No data on chloroform-treated vaccines are available beyond a four-month period.

While experimental evidence is a sound foundation on which to base the use of a vaccine in the field, the final test of a product is its efficacy under practical conditions of field use. Although we have information from the experimental standpoint as to what may be expected from vaccination, more complete and controlled information on the use of vaccines in the field is highly desirable. It is realized that this may be rather difficult to obtain and that a considerable period of time may elapse before sufficient controlled data are at hand to permit an evaluation, but it is also believed that the question is of sufficient importance to warrant the effort to obtain such data.

The control of rabies is a problem that comes under the domain of the veterinary profession and those medical men engaged in public health work, and it is to those groups that we must look for data on the use of the vaccines in the field. Data as they are obtained could be forwarded to agents or agencies for compilation. The federal Bureau of Animal Industry is interested in this subject and would, for one, be glad to undertake such a compilation

of data. Such data should include the number of dogs vaccinated, with dates and type of vaccine used; any untoward reactions following vaccination; apparent failures of the vaccine to protect, with dates of vaccination and exposure; apparent protection, also with dates of vaccination and exposure; results in controlling the outbreaks of the disease when vaccination is used and when it is not used, and any other pertinent information.

It is urged that practicing veterinarians, state officials, public health workers and other interested parties take the necessary steps for the collection of these data.

Of equal importance to the proper preparation of a biological product from the standpoint of results is its administration. The use of rabies vaccines should be left in the hands of graduate veterinarians only. It is a professional procedure requiring skill, a knowledge of what the vaccine is, what it is intended to do, and what its limitations are.

Even though a vaccine is highly effective, failures are apt to occur and a false sense of security should not obtain because of vaccination.

As cases of post-vaccination paralysis have been observed with the phenol-killed type of vaccine, the possibility of this occurrence, however remote, should be kept in mind and absolute assurance that this type of vaccine can cause no harm to the dog should not be given. Data on this point, with respect to chloroform-treated vaccine, must await further use of this vaccine in the field.

In conclusion, vaccination, no matter how effective, can not by itself control outbreaks of rabies. The stray dog is a factor that must always be considered and such standard control measures as licensing, quarantine, and the impounding and destruction of the stray dogs vigorously enforced are essential for the control and eradication of the disease.

REFERENCES

[1]Eichhorn, A., and Lyon, B. M.: Prophylactic vaccination of dogs against rabies. Jour. A. V. M. A., lxi (1922), n. s. 14 (1), pp. 38-42.

[2]Umeno, S., and Doi, Y.: A study of the anti-rabic inoculation of dogs and the results of its practical application. Kitasato Arch. Exp. Med., iv (1921), p. 89.

[3]Schoening, Harry W.: Studies on the single-injection method of vaccination as a prophylactic against rabies in dogs. Jour. Agr. Res., xxx (1925), p. 431.

[4]Schoening, Harry W.: Experimental studies with killed canine rabies vaccines. Jour. A. V. M. A., lxxvi (1930), n. s. 29 (1), pp. 25-33.

[5]Verge, J., and Van Huyen, Pham: Recherches sur la vaccination antirabique du chien. Recueil Med. Vet., cvi (1930), 5, p. 249.

[6]Kelser, R. A.: Chloroform-treated rabies vaccine. Jour. A. V. M. A., lxxvii (1930), n. s. 30 (5), pp. 595-603.

[7]Schoening, Harry W.: Experimental and field results of the single injection canine rabies vaccine. Corn. Vet., xviii (1928), 2, pp. 105-115.

RABIES CONTROL IN OHIO

By LESTER C. NEER,

Division of Health, Dayton, Ohio

The control of rabies in the large centers of population presents a public health problem that is very difficult of satisfactory solution. The uncertainty or variability of the incubation period, public sentiment in regard to the muzzling of dogs, the ineffectiveness of quarantine regulations, difficulty in enforcing license laws and thereby eliminating stray dogs, and ignorance of the condition by the general public are some of the handicaps encountered by those charged with the responsibility of combating this most dreadful disease.

Statistics gathered from the six largest cities in Ohio, namely, Cleveland, Cincinnati, Toledo, Columbus, Akron and Dayton, for the year 1930, show a combined total of 330 cases of canine rabies. This made necessary the authorization of over 700 Pasteur treatments by the health departments of these cities. Fortunately there were no human deaths. Records of the Ohio Bureau of Vital Statistics for 1930 show that three persons died of this disease in other parts of the State.

Control measures must necessarily be dependent upon existing statutes. A dog law recently enacted in Ohio, although having many commendable features, gives rabies but slight consideration.

A suggested amendment which might advantageously be incorporated in this law would be to the effect that all dogs known to have been bitten by a dog suffering from rabies shall be declared a nuisance and be destroyed. This in accordance with recommendations of the International Conference on Rabies (1927).

Vaccination and quarantining of such exposures have proven unsatisfactory. One of the cities mentioned above has an ordinance requiring all dogs on the streets to be muzzled or on leash. The excellent results obtained in England and other foreign countries highly recommend such a control measure. However, the success of this law will depend upon its applicability to all dogs. The larger the city, the less difficulty there will be in obtaining the approval of public sentiment in securing the passage of such an ordinance.

VACCINATION

Arguments may be advanced both for and against protective inoculation. Those in favor of it cite the remarkable results

obtained by its use in Japan. Those opposed to it discourage its use because the immunity conferred is so short lived. Broerman and Edgington,[1] in their researches at the Ohio Agricultural Experiment Station, found that vaccination gave satisfactory protection against three strains of street virus but practically none against a fourth strain. Furthermore, few large cities can boast of over a 75 per cent registration of all dogs in their areas. The result of a consideration of these two last mentioned factors shows vaccination to be only 56 per cent effective.

Recently a chloroform-killed vaccine has made its appearance upon the market. Its immunizing properties are said to be far superior to those of the older phenol-killed preparation. While this method of prevention may not be absolute, it will serve a useful purpose in giving added impetus to a decline in incidence.

Educational Campaigns

Newspapers are of inestimable value in giving publicity to outbreaks in a community. Descriptive bulletins issued by health agencies and circulated in the schools are helpful. Radio broadcasts on the subject may be utilized. Children should be warned not to pet or fondle stray dogs. The coöperation of good citizens, more especially the dog-owners, should be solicited to obtain a strict compliance with the law governing the keeping of dogs. Owners should be educated to consult their veterinarian when their dog is ill. This would prevent the possible needless sacrifice of human life and the expenditure of thousands of dollars for Pasteur treatments made necessary through exposures, by attempts of the uninformed, to remove bones (?) from the throats of their sick pets.

Conclusion

From the foregoing it will be readily deduced that the stray dog is a potent factor in the control of rabies. In an effort to control this disease, regardless of the plan of attack, there must be a rigid enforcement of the license law with its attendant elimination of all strays; otherwise, muzzling ordinances, prophylactic vaccination, quarantine regulations, etc., will avail very little. Stray dogs are an unmitigated nuisance. A dog, even though "man's best friend," should be put in its place as a supervised pet. Let us advocate fewer and better dogs.

Reference

[1]Broerman Alvin, and Edgington, B. H.: The Duration of Immunity in Dogs Following the Single-Injection Method of Antirabic Vaccination. Bulletin 423, Ohio Agricultural Experiment Station, Wooster, Ohio, July, 1928.

SPIROCHETOSIS ASSOCIATED WITH INFECTIOUS BRONCHITIS

By M. W. EMMEL, *Auburn, Ala.*

Department of Animal Pathology, Alabama Polytechnic Institute

Three adult birds were recently brought, by the owner, to our laboratory for examination. A diagnosis of infectious bronchitis was readily made, as the birds showed typical symptoms of this disease, gasping for breath, sneezing, and slight rattling sounds in the trachea. The history of the outbreak also was quite typical of this disease. Postmortem revealed an inflamed tracheal mucosa, especially near the larynx, with an abundant catarrhal exudate which, from our observations, did not differ from our usual findings in such cases.

At that time we were making more or less routine examinations of smears prepared from the exudate and scrapings of the tracheas of birds affected with this disease. In each of these three cases it was surprising to find a very large number of what appeared to be spirochetes. Examination under the dark field proved them to be such.

The spirochete varied from 6 to 18 microns in length and from 0.4 to 0.6 microns in width. The spirals were rather gradual and numbered from 3 to 8, one spiral occurring in about every two microns of length.

An effort was made to cultivate the spirochete without success. Efforts to transmit the disease to healthy young birds by inoculations of the catarrhal exudate into the trachea failed. We were unsuccessful in getting more birds for study from this flock. Later, however, the owner reported that the birds responded promptly to individual treatment.

Received for publication, March 23, 1931.

It appears that the spirochete was merely playing the role of a secondary invader and was not a direct etiological agent. Direct smears from the trachea are very seldom made from birds affected with infectious bronchitis and it would not be surprising to learn that secondary invasion by spirochetes may be of rather frequent occurrence.

A RECORD OF CASES OF MILK FEVER BY MONTHS OVER A PERIOD OF FOUR YEARS

By JAMES K. STROCKBINE, *Bedford, Pa.*

Following is a record of cases of milk fever that I have treated in my practice during a period of four years. Cases that improved with one treatment, but later had relapses, are considered, in the summary, as two separate cases. During 1927, two cases had relapses and were treated the second time. During 1928, there was one such case; during 1929, two cases; and during 1930, only

TABLE I—*Cases of milk fever by years and per month*

YEAR	CASES	
	TOTAL	PER MONTH
1927	34	2.83
1928	36	3.00
1929	40	3.33
1930	36	3.00
Total	146	3.04

one case. During the years 1927 and 1930, the months of May and June showed the largest number of cases of any months in these years. In 1929, October and November were the high months. In 1928, May and June were below the average, as was also the case in 1929. September was the low month in both 1928 and 1930.

FOREIGN BODY CAUSES GASTRO-ENTERITIS IN A CAT

By L. B. SHOLL, *East Lansing, Mich.*

Department of Animal Pathology, Michigan State College

The animal is a yellow and white, female Persian cat. The owner took the cat to a veterinarian on April 5, with the history that possibly she had swallowed a piece of cloth a day or two

before, and that she had been vomiting. During 24 hours in the hospital, the cat showed some nervous symptoms, but was otherwise normal in appearance. Three enemas were administered. The owner took the cat home on April 6. On April 7, she appeared to be worse and was taken to another clinic. The temperature was 102.4° F., and the animal was rather emaciated and listless. Anorexia was complete. There were no other symptoms except for some nervousness and muscular twitchings. An enema was given with no results. The cat grew continually

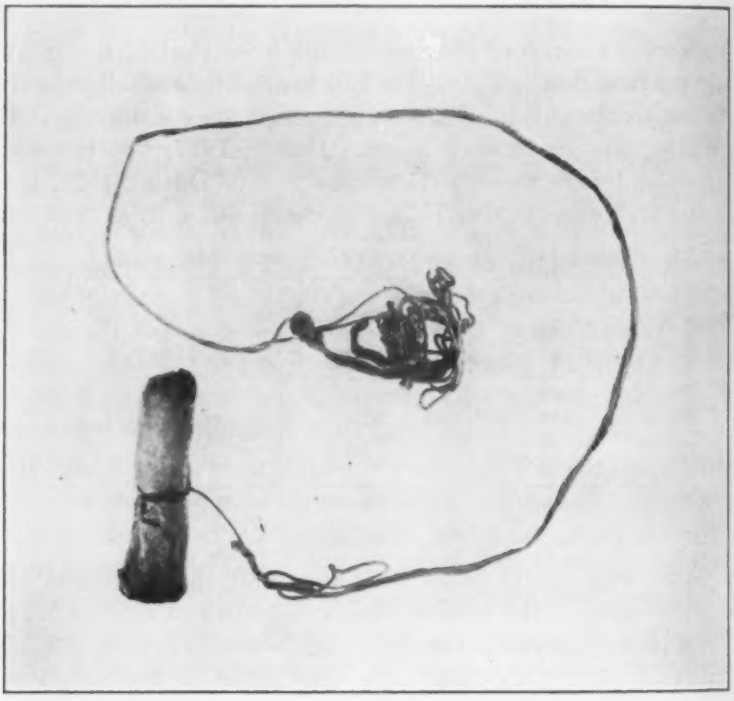

FIG. 1. Roll of cloth and attached string removed from cat's stomach and intestine.

more listless. On April 9, the temperature had dropped to 100° F. Death occurred on April 10.

Autopsy reveals the following. The animal is rather emaciated. The visible mucous membranes are congested. No gross changes are found in the head and neck except for rather marked congestion of the brain and meninges. The only change noted in the chest is some congestion of the lungs. In the abdomen the mesenteric vessels show marked injection, and there are some hemorrhages in various places over the small intestine. A

rather firm roll of cloth, 5 cm. long and 1 cm. in diameter, is lodged in the pylorus of the stomach. The gastric mucosa is somewhat congested, and numerous small hemorrhages are scattered quite generally throughout. There is some mucus, containing a small amount of blood, in the stomach. A piece of string, tied to the roll of cloth, passes into the small intestine. This string, in three strands, ends in a tangled wad about 32 cm. from the cloth. The small intestine, about three times the length

FIG. 2. Note the line of erosion and necrosis (x) which is almost continuous through the entire length of the intestine. Also note the dark hemorrhagic areas.

of the string as described above, is puckered on the string so that the wad is well down in the ileum. The intestine is empty except for some mucus. The mucous membrane is congested. A line of erosion and necrosis of the mucosa 2 to 3 mm. wide extends from the pylorus to the cecum, caused by friction of the string. The cecum and large intestine show no gross changes. The liver and kidneys show some parenchymatous degeneration.

BACTERIUM ABORTUS (BANG) ISOLATED FROM A GELATINOUS INFILTRATION FORMED IN THE UTERUS OF A COW

By AMANDA HELEN HARMS, *Lexington, Ky.*,

Kentucky Agricultural Experiment Station

Fetuses and placentas of aborting cows have been examined in the laboratory of the Kentucky Agricultural Experiment Station

since 1911. One of the most unusual specimens examined came to our attention on March 5, 1930, when a gelatinous infiltration was brought in with the placenta of an aborting cow. The cow was due to calve on April 20. About a pint of this infiltration had formed in the uterus and was removed with the membranes. Plate cultures of this material were made by streaking very small amounts on nutrient agar. Parts of the placenta were cut up into small bits and streak dilutions of it were made on agar.

After culturing by the Nowak method, two of the plates from the gelatinous material contained a great number of colonies of *Bact. abortus* (Bang) in pure culture. Another plate was nearly covered with *Bact. abortus* as is noted in streak dilutions of pure culture of the organism. Stained smears of this infiltration showed the Bang organism present in large numbers. Several small colonies of *Bact. abortus* (Bang) developed on the plates streaked with small bits of the placenta. The blood serum of this cow responded positively to the agglutination test.

A similar case was observed previously by the attending veterinarian on April 18, 1929, when another cow in the same herd delivered a premature calf. The calf, which was twenty-two days premature, lived and the cow cleaned without assistance. The gelatinous material from this cow was not brought to the laboratory for examination. The membranes, however, were sent to us and on being cultured were found to harbor the abortion organism. The blood serum of this cow also reacted positively to the agglutination test to a high degree.

Springtime Activities

The following appeared in the Cynthiana (Ky.) Democrat, under date of April 16, 1931:

VETERINARY NOTICE!

Spring is a good time to have your live stock looked over and see if they need vaccinating against disease. Also perhaps your sheep need dipping with an official dip. I am resuming my veterinary practice to a limited extent and am prepared to do any work in this line and answer all calls.

DR. H. APPEL,
Millersburg pike,
Phone 646-X.

Practice will be limited but Dr. Appel will answer all calls, if we understand the situation correctly.

The United States marshal at Elizabeth, N. J., destroyed 120,000 cans of substandard ether at the city dump, March 20.

A Cerebellar Disorder in Chicks Apparently of Nutritional Origin. Alwin M. Pappenheimer and Marraime Goettsch. Jour. Exp. Med., liii (1931), 1, p. 11.

Growing chicks maintained on a diet consisting of milk powder, casein, starch, yeast, cod-liver oil, salts and filter paper develop ataxia, tremors, retraction or twisting of the head, clonic spasms of the legs and stupor. These symptoms may appear suddenly, usually between the 18th and 25th days, and may end in death. If recovery takes place, the chicks may go on to normal development. Definite lesions are found in the cerebellum of the affected chicks. These consist of edema, necrosis and hemorrhages. Hyaline thrombi are found in the capillaries in and about the degenerated areas.

Experimental Glomerulonephritis in a Monkey. E. T. Bell and B. J. Clawson. Amer. Jour. Path., vii (1931), 1, p. 57.

A form of chronic diffuse glomerulonephritis was produced in a monkey by repeated intravenous injections of streptococci over a period of four years. This method of injection was used in order to develop a chronic type of nephritis. The lesion produced was characterized histologically by a marked increase in the capillary endothelium and increase in the thickness and number of layers of the capillary basement membrane. The glomerular lesion resembled the human "lipoid nephrosis of mixed type," except that no fat was present.

Critical Tests of Butylidene Chlorid for Equine Parasites. Willard H. Wright, H. B. Raffensperger, John Bozievich and Paul C. Underwood. Abst. Jour. Parisitol., xvii (1930), 2, p. 117.

The properties of butylidene chlorid are described. Normal butylidene chlorid given to four animals at a dose-rate of 0.207

to 0.317 cc per kilogram of body weight and followed in five hours by 960 cc of raw linseed oil for a 1000-pound animal resulted in efficacies of 50, 94, 100 and 100 per cent, respectively, against *Strongylus* spp. and 100 per cent for *Trichonema* spp. in all four animals. The anthelmintic removed all of the *Poteriostomum* spp. present in the three animals harboring these parasites. The treatment was relatively ineffective against *Gastrophilus* spp.; other species of parasites were not present in sufficient numbers to warrant conclusions. The efficacy of butylidene chlorid was considerably lowered in other instances where administered in raw linseed oil or where followed by aloes or by a castor oil-mineral oil mixture. Liver lesions in treated animals were confined to cloudy swelling with some fatty degeneration but no central necrosis. No kidney lesions were produced. Normal butylidene chlorid was well tolerated and produced no gross pathological alterations.

Lysis of Tubercle Bacilli. H. J. Corper. Amer. Rev. Tuber., xxiii (1931), 1, p. 55.

Tissue blocks (dog's spleen, liver and kidney) containing tubercle bacilli sterilized by means of sulfuric acid and kept at incubator temperature after the addition of glycerin water revealed a diminution of acid-fast bacilli with complete disappearance within about 2 to 4 months, while the same tissues kept at room temperature revealed no such changes within this time. Ground tissues sterilized with sulfuric acid, to which suspensions of fresh or heat-killed tubercle bacilli in glycerin water have been added, reveal a gradual disappearance of the acid-fast bacilli within about one to two months at incubator temperature. Tubercle bacilli incubated at 37° C. in tissues sterilized with sulfuric acid, lose their viability within 3 to 10 days as the result of the formation of toxic autolysates and undergo a loss of morphological integrity which is evident from the disappearance of acid-fast staining properties during which there are to be noted no actual morphological changes. It appears that when lysis of the tubercle bacilli begins, growth is interrupted and at a stage attained at the time of initiation of lysis, and the only changes coincident with lysis are a dissolution of the cell, possibly with a slight swelling and pyknosis, paralleling that occurring in the nucleus of tissue cells undergoing autolysis or digestion and necrosis.

A Comparison of the Inclusion Bodies of Fowl-Pox and Molluscum Contagiosum. Ernest W. Goodpasture and C. Eugene Woodruff. Amer. Jour. Path., vii (1931), 1, p. 1.

The inclusion bodies of molluscum contagiosum may be freed from surrounding cellular material by tryptic digestion. The molluscum bodies, unlike fowl-pox inclusions, are found to be sticky and gelatinous after they have been digested. The gelatinous matrix of molluscum bodies has a markedly granular appearance due to the presence within it of myriads of Lipshütz granules. These granules are identical in size, shape and staining reaction with the Borrel bodies of fowl-pox. They are resistant to the action of trypsin. On being placed in distilled water the molluscum bodies show little or no swelling; fowl-pox inclusions swell markedly, due probably to their lipoid material acting as a semipermeable membrane. Trituration readily breaks up molluscum inclusions while fowl-pox inclusions fail to break so readily. The author suggests that this latter difference may account for the relatively greater filtrability of the former. Cross-inoculation experiments on fowls and man have proved unsuccessful. Attempts to transfer molluscum to monkeys and other laboratory animals were also unsuccessful.

Epizoötic Encephalitis of Foxes. II. General consideration of fur range epizoötics. R. G. Green. Amer. Jour. Hyg., xiii (1931), 1, p. 201.

Fox encephalitis with a slow rate of spread may be present enzoötically among foxes in pens. When groups of those foxes are run together in fur-ranges, the disease increases to a violent epizoötic. Any large group of apparently healthy foxes from an endemic focus appears to develop an epizoötic, indicating that carriers of the disease are common. The epizoötic may appear in from 4 to 6 days after common exposure and reach a peak in from 2 to 3 weeks. The mortality in young foxes less than ten months of age is about two and one-half times greater than that in adult foxes over one and one-half years old. The mortality in young foxes appears to average 12.5 per cent of the population when based on known losses, and becomes 18.5 per cent when approximated to include mutilated and missing foxes. The corresponding mortality figures for adult foxes are 3.5 and 8.5 per cent. Individual ranch group mortalities as high as forty per cent of the group population occur. In several groups of foxes

studied which have common ancestors, susceptibility to the disease appears uniform. Significant variations in the mortality of whole range groups and of ranch groups in the same range epizoötic occur. Evidence points to fur-range conditions and organizations as responsible for these mortality variations. This indicates that rapid variations in the virulence of the virus occur in fur-range epizoötics.

HUMAN TRICHINELLA SPIRALIS INFECTIONS AND THE BACHMAN PRECIPITIN TEST. George W. Hunter III. Amer. Jour. Hyg., xiii (1931), 1, p. 311.

The perfection of the Bachman precipitin test offers great possibilities in the diagnosis of cases of trichinosis which are of quite long standing. The author suggests that in addition to the part it may play in the diagnosis of human infection it opens the entire field of meat inspection for trichinosis. Thus it may be possible for live stock, primarily hogs, to be given the precipitin test before slaughter. This would not only help to prevent human infections by discarding heavily infected animals but would in addition open up the way for raising the standard of physical fitness (freedom from infection by parasitic worms) for hogs on the hoof. It may be even possible to rate the hogs according to the degree of infestation shown.

RESISTANCE OF CHICKENS TO PARASITISM AFFECTED BY VITAMIN A. James E. Ackert, Marian Fisher McIlvane and Naomie Zimmerman. Amer. Jour. Hyg., xiii (1931), p. 320.

Sixty White Leghorn chickens, from 7 to 8 weeks of age, in two preliminary tests, and 127 chickens, from 4 to 7 weeks of age, in four experiments, were used to ascertain if resistance to the intestinal round worm, *Ascaridia lineata*, was affected by vitamin A in the diet. Cod-liver oil was the source of vitamin A. The criteria for judging resistance of the birds to the parasites were the numbers and the lengths of *A. lineata* remaining in the intestines of the chicken at the close of the experiment. During the five-week period of the experiments those birds fed vitamin-A-deficient diets showed a characteristic avitaminosis. These birds showed less resistance to parasitism than those fed cod-liver oil. The authors attributed the fact that larger numbers of worms remained in birds fed a vitamin-A-deficient diet to weakened peristalsis, a deficient diet making it much easier for the young worms to withstand the rigors of peristalsis.

RESISTANCE OF CHICKENS TO PARASITISM AFFECTED WITH VITAMIN B. James E. Ackert and L. C. Nolf. Amer. Jour. Hyg., xiii (1931), 1, p. 337.

Preliminary tests involving 90 chickens and three regular experiments on 135 chickens were carried out to ascertain if the vitamin B complex is a factor in the resistance of chickens to the intestinal round worm, *Ascaridia lineata*. The source of vitamin B was baker's yeast. The results of the experiments showed that groups of chickens given the same number of embryonated eggs of the parasite had more worms when their diets lacked vitamin B than did similar groups of chickens whose rations contained adequate amounts of this vitamin. The larger number of worms was attributed in part to partial paralysis of the intestines due to a lack of vitamin B, the greatly weakened peristalsis probably aiding the worms in remaining in their habitat. Larger worms were found in those chickens whose diet contained yeast than in the groups whose rations lacked it. It is suggested that the yeast may contain a factor which is favorable to the growth of worms.

THE BLOOD CHEMISTRY OF HENS BEARING ROUS SARCOMA NO. 1. J. H. Roe and Helen M. Dyer. Abst. Arch. Path., xi (1931), 1, p. 160.

Twelve hens bearing Rous sarcoma No. 1 showed no change in the non-protein nitrogen, uric acid, creatinine, chlorids, cholesterol, serum calcium and inorganic phosphorus, hemoglobin and bilirubin of the blood. The analyses were performed at times varying from 18 days before death to the day of death. The blood sugar of the sarcomatous hens was found to be elevated. There was a questionable lowering of the carbon dioxid-combining power of the blood of the tumor-bearing birds.

THE INCIDENCE, PATHOGENICITY AND TRANSMISSION OF LEUCOCYTOZOÖN ANATIS OF DUCKS. E. C. O'Roke. Jour. Parasitol., xvii (1930), 2, p. 112.

One hundred and seventy ducks including domestic Pekings, Indian runners, wild mallards and wild black ducks were used in these investigations in Michigan. Ducks transferred from the Biological Station to various lakes showed a high percentage of infestation. Young ducklings unprotected by screen and protected from all other insects except *Simulium venustum* became

infested. *Simulium venustum* is believed responsible for the transmission of this parasite. As many of 75 of these flies fully gorged with blood have been removed from a single duckling. Parasites appeared in the blood of ducks 12 days after they had been exposed to the bites of flies. Oökinetes were found in the flies after they had fed upon infected ducklings. *Leucocytozoön anatis* is apparently not harmful to adult ducks. It is pathogenic for ducklings, the mortality being 35 per cent in the cases studied.

Observations with a New Transmissible Strain of the Leucosis of Fowls. J. Furth. Jour. Exp. Med., liii (1931), 2, p. 243.

Myeloid leucosis and erythroleucosis can be transmitted from one bird to others by emulsions of infiltrated organs, whole blood cells, and plasma. Inoculation is more often successful with blood cells or with whole blood than with plasma or with emulsions of organs infiltrated as a result of leucosis. Inoculation with material from a bird with myeloid or with erythroleucosis produces both myeloid leucosis and erythroleucosis and in many instances mixed forms with characteristics of both. Evidence is wanting that lymphoid leucosis is caused by the agent that transmits myeloid leucosis and erythroleucosis. The occurrence of lymphoid leucosis among the birds inoculated with material from myeloid leucosis or erythroleucosis may be explained as spontaneous disease. Injury to cellular structure by treatment with distilled water and by repeated freezing and thawing does not destroy the agent that transmits the disease. Berkefeld filtrates have failed to transmit regularly myeloid leucosis or eyrthroleucosis. The transmissible agent is filtrable, although there are technical differences in its filtration.

Transmission Experiments with Leucosis of Fowls. E. L. Stubbs and J. Furth. Jour. Exp. Med., liii (1931), 2, p. 269.

In carefully controlled experiments, fowl leucemia was transmitted from chicken to chicken by injection of 25 fowls, 13 were injected intravenously with blood from a chicken with erythroleucosis and twelve with blood from a chicken with myeloid leucosis. The injected birds and an equal number of uninjected controls were kept in tiers of alternating cages under as identical conditions as possible. All birds were of the same stock and age. Fifty-two per cent of the twenty-five fowls inoculated developed

leucemia within 4 to 10 weeks after injection. The two types of leucemia, erythroleucosis and myeloid leucosis, developed in both groups irrespective of the types used for injection. Among the uninjured controls no cases of erythroleucosis or of myeloid leucosis were observed. Lymphoid leucosis occurred in one injected bird but since it occurred also in one control, it may be assumed that it was probably not caused by the injected material.

Seven Stations Broadcasting Allied Laboratories Program

The Allied Laboratories, Inc., have announced a radio program for this year which goes considerably ahead of anything previously undertaken along this line. The schedule will continue through the summer and well into the fall months. The entire program will be devoted to promoting the interests of the practicing veterinarian. The following stations will broadcast the messages: WLW (Cincinnati), WLS (Chicago), WHO (Des Moines, Iowa), WOC (Davenport, Iowa), WOW (Omaha, Nebr.), WDAF (Kansas City, Mo.) and WNAX (Yankton, S. D.).

See detailed announcement in advertising section, giving wave lengths and exact times.

The Veterinary Bulletin

The first number of the *Veterinary Bulletin*, published by the Imperial Bureau of Animal Health, Weybridge, Surrey, England, made its appearance under date of April, 1931. The new publication takes the place of the *Tropical Veterinary Bulletin*, formerly published by the Bureau of Hygiene and Tropical Diseases, and discontinued with the issue of December, 1930.

The *Veterinary Bulletin* deals with all aspects of animal health, in so far as they relate to original research and to administrative control, but it will not deal with clinical material from the standpoint of the practitioner. Four numbers are to be published during 1931. Beginning January 1, 1932, the new journal will appear as a monthly publication.

Practically no original material appears in the first issue, consisting of 96 pages. There are no advertisements. The material making up the initial number consists almost entirely of abstracts of articles previously published elsewhere. In this connection it is of interest to point out that of the 62 articles dealt with under "Diseases Caused by Bacteria and Fungi," eleven appeared originally in the JOURNAL of the A. V. M. A.

ARMY VETERINARY SERVICE

Regular Army

Each of the following-named officers of the Veterinary Corps is relieved from his present assignment and duty at the station specified, at such time as will enable him to comply with orders, and will proceed to Washington, D. C., and report to the commanding general, Army Medical Center, on or about August 25, 1931, for the purpose of pursuing a course of instruction at the Army Veterinary School.

Captain Daniel S. Robertson, P. & B. Hdqrs., Fort Douglas, Utah.
Captain Lester W. Ingram, Fort Bliss, Texas
Captain John R. Ludwigs, Fort Monroe, Va.
Captain Josiah W. Worthington, Madison Barracks, N. Y.
Captain William H. Dean, Fort Riley, Kans.
2nd Lieut. Ralph W. Mohri, Army Medical School, A. M. C., Washington, D. C.

Captain James E. Noonan is relieved from assignment and duty at Fort Riley, Kans., effective on or about September 4, 1931, and will report to the commandant, the Cavalry School, Fort Riley, Kans., for duty as a student in the 1931-1932 troop officers' course.

The promotion of the following officers to the grade of Major, with rank from March 24, 1931, is announced:

Captain Elwood L. Nye
Captain Allen C. Wight

Veterinary Reserve Corps

New Acceptances

Paxton, John Dryden...Capt.....4135 Verne St, Fresno, Calif.
Shigley, Fred Martin....2nd Lt....203 Riley Apts., Fargo, N. Dak.

Promotions

Barstow, Ivan Lee.....Lt. Col....P. O. Box 309, Moscow, Idaho
Wells, John Raymond...1st Lt.....City Hall, West Palm Beach, Fla.

Dairy Inspectors Select Veterinarians for Officers

At the annual meeting of the Michigan Association of Dairy Inspectors, held at Jackson, February 11, 1931, three Wolverine veterinarians were elected officers of the organization. Dr. C. C. Schaefer (Ont. '11), of Flint, was elected president; Dr. E. J. McLachlan (Ont. '27), of Jackson, vice-president; and Dr. Hazen S. Atkins (Mich.'23), of Pontiac, secretary.

COMMUNICATIONS

The Code of Ethics

To the Editor:

Attention should be invited now and then to our Code of Ethics, and especially to Section V, Article 19, of the By-Laws, which has to do with advertising. Considerable pressure has been brought to bear occasionally upon veterinarians in good standing to induce them to write commendatory articles for the agricultural press and other publications on the value of numerous proprietary stock foods, proprietary remedies, disinfectants, biological products, etc. An attractive fee for doing so is given and it furnishes as well an indirect but attractive form of advertising.

In the great majority of cases infringements upon the Code of Ethics have been found to be due to a lack of familiarity with them, and the offender in most cases willingly withholds such objectionable features in the future when attention has been called to them. A veterinarian should not be induced by a high-powered salesman to publish his name conspicuously in directories or to see how near he can go to what is considered unethical in newspaper puffs, recommendations, etc., which are considered bad form, if not a breach of the Code of Ethics, but should rather try at all times to maintain the dignity of the profession.

The Code of Ethics has accomplished much in the past in the development of professional methods. Every member of the American Veterinary Medical Association has subscribed to it and is expected to observe each of the seven sections faithfully. There may be a question whether it is ethical or not to publish the recommendations of certain stock foods if the recommendation is made without the expectation of emolument, but there can be no excuse for such action when the recommendation is written for a price. To many it seems decidedly improper to publish a recommendation, even if given free, with the photograph and name and address of the writer. It is interpreted as indirect advertising and comes very close to the direct form. The chief purpose is usually for the good of the advertising firm and not for the benefit of the writer, the profession, or the public at large. The statement is made by Mr. Fred Bullock, of London,

in a "Handbook for Veterinarians," recently published, that this method of advertising is a prostitution of one's professional education and is a means, not of serving the community, but for assisting commercial concerns to increase their business. He also stated that it is disgraceful in a professional respect to give testimonials in favor of proprietary or patent preparations, medicines or appliances.

C. J. MARSHALL.

Philadelphia, Pa., March 31, 1931.

International Veterinary Congress

TO THE EDITOR:

At the April meeting of the New York County Veterinary Medical Association, a resolution was adopted whereby each member will be assessed one dollar per annum, in addition to the membership dues, towards defraying expenses of the International Veterinary Congress to be held in the United States in 1934. Similar resolutions were adopted also by the Long Island Veterinary Medical Association and the Hudson Valley Veterinary Medical Society.

It will require a considerable sum of money to entertain the Congress and we surely should be in a position to take care of the visitors as well as the other countries where International Veterinary Congresses have been held.

The delegation of American veterinarians who attended the International Veterinary Congress in London last year are fully aware of the responsibility of the veterinary profession in this country and that it would be advisable to have state and county societies adopt a similar procedure to obtain funds for the purpose.

By doing so, we would not only obtain considerable financial assistance but also it might assist us to influence Congress in Washington towards making a liberal appropriation towards the expenses of the International Veterinary Congress. Any publicity along this line by the JOURNAL will be greatly appreciated.

A. EICHHORN, *Chairman,*
A. V. M. A. Special Committee on International Veterinary Congress.

Pearl River, N. Y., April 9, 1931.

MISCELLANEOUS

Dr. Shillinger to Head Wild-Life Disease Work

Investigations of the diseases of wild life have been consolidated by the Bureau of Biological Survey, under a recent authorization by the Secretary of Agriculture. Dr. J. E. Shillinger (Geo. Wash. '14), senior veterinarian of the Biological Survey, will be in charge of the work. The object is to coördinate the study of wild-life diseases, chiefly those affecting mammals and birds, and to determine the causes of outbreaks and method of control. Laboratories will be established in Washington, D. C.,

DR. J. E. SHILLINGER

and in the field, for observation and investigation of disease-producing agents and of disease conditions among animals and birds, both in the wild and under controlled conditions, as on fur and game farms.

Wild-life disease investigations hitherto have been directed by the several divisions concerned, either independently or in coöperation with federal, state, or other responsible institutions.

Such coöperation, of course, will be continued, in accordance with the desires expressed by officials of veterinary colleges and other research institutions and individuals doing work in this field of wild-life investigations.

The various disease investigations in the past have been concerned with the so-called "duck sickness" in alkaline and other areas in Utah and elsewhere; outbreaks of disease on fur-farms, and maladies of blue foxes in Alaska, including a coöperative research project with the University of Minnesota on epizoötic diseases of fur animals and research in diseases of domestic rabbits, in coöperation with the University of Southern California; parasitic and other diseases of reindeer in Alaska, and related diseases in Scandinavian countries; the mortality among elk in Wyoming and among deer in other parts of the country. Other studies in coöperation with state departments and institutions and other federal bureaus have been concerned with maladies of upland game birds; quail and waterfowl parasites; "kewks" of swans in the Currituck Sound region; protozoan parasites of ducks in Louisiana and elsewhere; phosphorus poisoning among ducks in the vicinity of artillery proving grounds; lead poisoning in waterfowl from eating shot deposited in the mud on shooting grounds; and suspected poisoning of valuable wild-life forms in connection with insect control by spraying and dusting and with weed eradication by chemical means.

Doctor Shillinger has been engaged on fur-animal disease investigations with the Biological Survey for the last four years, before which he was an associate veterinarian and veterinary inspector of the Bureau of Animal Industry for 13 years, except for a period of war-time service in the Army Veterinary Corps. He has appeared on the programs of A. V. M. A. conventions several times during recent years.

Meat Production and Consumption in 1930

Total production and consumption of meats in the United States last year was the smallest since 1922, and per capita consumption of meats was the smallest since 1919, according to estimates by the Bureau of Agricultural Economics, U. S. Department of Agriculture.

The bureau places total production of dressed meat, not including lard, at 16,394,000,000 pounds in 1930 as compared with 16,803,000,000 pounds in 1929, and 16,285,000,000 pounds in

1922. All of the decrease in 1930, as compared with 1929, was in pork.

The 1930 production of beef was 6,076,000,000 pounds compared with 6,065,000,000 pounds in 1929; veal, 833,000,000 pounds against 816,000,000 pounds in 1929; lamb and mutton, 820,000,000 pounds against 699,000,000 pounds; and pork, 8,665,000,000 pounds against 9,223,000,000 pounds.

Production of beef increased slightly, due to heavier weights of cattle slaughtered and a larger farm slaughter, but total consumption decreased as a result of slightly larger exports and smaller imports. Total exports of all meats, excluding lard, last year, were the smallest in thirty-one years. Total veal production and consumption was slightly larger last year than in 1929. Lamb and mutton shoved the greatest relative increase in both production and consumption. Lamb production has increased 50 per cent since 1922.

Per capita consumption of meats, excluding lard, is placed at 131.7 pounds, the smallest since 1919, when consumption was 130 pounds. In 1929 it was 136.8 pounds and in 1924, the record year since 1908, it was 149.7 pounds. The smallest per capita consumption in the last 30 years, 120.1 pounds, was in 1917. The quantity of lard used per capita last year was 13.8 pounds as against 14.3 pounds in 1929.

Per capita consumption of pork last year was 68.2 pounds compared with 72.8 pounds in 1929, and a high of 74.7 pounds in 1923 and 1924. The smallest consumption per capita was 49.3 pounds in 1917. Per capita consumption of beef last year was 50.1 pounds against 51.4 pounds in 1929. Per capital consumption of veal in 1930 amounting to about 6.8 pounds was practically the same as in 1929 and 1928. The smaller consumption of veal in recent years is attributed to reduced calf slaughter. In 1925 the per capita consumption was 8.7 pounds.

Per capita consumption of lamb and mutton has been increasing since 1922, and was 6.6 pounds in 1930 as against 5.8 pounds in 1929. The 1930 average was the largest since 1914, but was 1.5 pounds smaller than the record, 8.1 pounds in 1912. Consumption in 1922 was 5 pounds. Increased consumption is attributed to the marked increase in lamb production which has been under way since 1922.

—*The Cattleman.*

The Women's Auxiliary

About this time each year, the ladies of the A. V. M. A. begin planning for the coming convention, especially the ladies of the Auxiliary. This year we are planning for a very interesting meeting in Kansas City and are expecting a big attendance. There will be some splendid reports of the work done during the year ($1,900.00 loaned to students since September 1, 1930) and a very entertaining general program besides.

The meeting in Los Angeles was very short, nevertheless considerable business was transacted. The revisions of the constitution were given the first reading, so that the final vote upon them may be taken in Kansas City. Article II of the by-laws was amended, so that, beginning in 1930, the initiation fee of fifty cents will be dropped. The dues will remain the same ($1.00 per year).

Two very pleasant things occurred during the latter part of 1930. The Women's Auxiliary of the Virginia State Veterinary Medical Association sent $25.00 to the A. V. M. A. Auxiliary for their loan fund. Since the discontinuance of the New York State Veterinary College at New York University, the Ladies' Auxiliary of that institution has had no use for the funds in the treasury of the organization. Rather than have the money lie idle, the officers transferred the full amount of the fund (nearly $300.00) to the A. V. M. A. Auxiliary. These two donations came at a very opportune time, as we were at a loss to know how to meet the demands upon our funds without borrowing money. We are indeed grateful to these organizations.

Since August, 1922, when our loan fund was first put into operation, we have loaned $5,625.00 to 19 students and have $2,550.00 now outstanding.

Here's hoping that every member of the A. V. M. A. who goes to Kansas City will take his wife with him and will see that she becomes a member of the Women's Auxiliary if she is not one already!

Officers of the Auxiliary are as follows: President, Mrs. J. D. Grossman, Columbus, Ohio; first vice-president, Mrs. J. C. Flynn, Kansas City, Mo.; second vice-president, Mrs. L. M. Hurt, Pasadena, Calif.; third vice-president, Mrs. H. C. H. Kernkamp, Saint Paul, Minn.; fourth vice-president, Mrs. H. E. Bemis, Philadelphia, Pa.; recording secretary, Mrs. S. E. Hershey,

Charleston, W. Va.; loan secretary, Mrs. R. P. Marsteller, College Station, Texas; treasurer, Mrs. H. P. Hoskins, Detroit, Mich.

MRS. S. E. HERSHEY, *Secretary.*

Chappel Kennel Foundation Seeks Typical Boy-Dog Combination

A search for America's typical boy and dog was begun by the Chappel Kennel Foundation, of Rockford, Ill., recently.

Two hundred and fifty dollars in cash, and immortality by having their likenesses reproduced in oils on canvas by a famous artist, await the chosen pair, which the Foundation is anxious to preserve for the inspiration of future generations as a symbol of the high type of companionship represented by the boy-dog combination of our own day. The winning team also will be presented to many notables, will probably be starred on the radio and in the movies, and in general enjoy the plaudits of an admiring multitude.

Selection of the winning pair is to be left in the hands of a jury of prominent men and women which is now being completed. The choice is to be made from nominations which the public is invited to submit to the Foundation prior to September 15, 1931. Photographs of contestants may be submitted with the nominations, but a final decision will not be made by the judges until they have seen and investigated the leading candidates.

To be eligible for nomination to the boy-and-dog contest, a youngster must not be under four or over fourteen years of age. The dog must be his own or that of a member of his immediate family. The age, size, color and breed of the dog are of secondary importance.

In inaugurating the boy-dog search, Mr. L. J. Brosemer, director of the Foundation, stated:

> Character building in the young is one of the great problems of the times. The Foundation is convinced that a dog makes a boy a better man and is encouraging every home with a boy to keep a pure-bred dog. A recent study of a large penal institution revealed the fact that less than one per cent of its inmates had a pet to play with in their formative years. Through the boy-dog contest, the Foundation hopes to catch the spirit of this comradeship and perpetuate it in some tangible form for this and future generations.

Veterinarians are urged to bring this contest to the attention of their clients, especially those having boys between the ages mentioned above.

NORTHEASTERN OHIO VETERINARY ASSOCIATION

Veterinary practitioners of northeastern Ohio met at the office of Dr. George Springer, Ashtabula, Ohio, on January 4, 1931, and organized the Northeastern Ohio Veterinary Association. Dr. Springer was elected president and the other officers include Dr. Ernest Hatton, Orwell, vice-presedent, and Dr. L. D. Whitwood, Jefferson, secretary-treasurer. The territory covered by the new association extends from Cleveland to the Pennsylvania line and from Lake Erie to Warren.

NEW MEXICO VETERINARY MEDICAL ASSOCIATION

Twelve graduate veterinarians met at Santa Fe, New Mexico, January 15, 1931, and organized the New Mexico Veterinary Medical Association. The new organization adopted a constitution and by-laws and elected officers as follows: President, Dr. Truman I. Means, Santa Fe; vice-president, Dr. Frederick L. Schneider, Albuquerque; secretary-treasurer, Dr. Frank H. Barr, Albuquerque. These officers, with Drs. W. A. Savage, W. C. Wiley and H. C. Schipman, constitute the Executive Committee.

KANSAS VETERINARY MECICAL ASSOCIATION

The twenty-seventh annual meeting of the Kansas Veterinary Medical Association was held in Topeka, January 21-22, 1931. Due to the extremely nice weather, the attendance was around two hundred.

In his address, President L. E. Brunscher gave much credit to the ethical supply houses for their efforts to keep veterinarians supplied with products that will enable them to "keep the jump" on the patent medicine vendors. He also spoke at some length on the benefits to be derived from attending veterinary meetings, from the standpoint of establishing good fellowship and creating the spirit of colleague rather than of competitor.

The Educational Committee presented one of the most interesting reports read at the meeting. The Committee has made arrangements with the *Kansas Farmer*, one of the leading farm publications of the Middle West, to establish a new department, entitled, "Live Stock Health," under the auspices of the Kansas Veterinary Medical Association. It is intended that this department will present, each week, an article, by a veterinarian, which will give to owners of animals first-hand information regarding problems involving animal health.

The Committee recommends: First, that the information given to the public in these articles should be written in a manner that will do the most good. Second: That we emphasize the fact that although anyone can soon be shown how to give medicine to or care for sick animals, it takes four years of intensive college training to make a veterinarian. Therefore, since the average person does not have a veterinary education, care should be used in giving this information so that harm will not be done to live stock. Third: That all articles written for publication in the *Kansas Farmer* should be veterinary farm articles. Fourth: That all articles should be educational, beneficial and should contain first-hand information. Fifth: That every article written for the *Kansas Farmer* be carefully edited before publication. This is an educational project and is truly worth while. The *Kansas Farmer* is giving the Association space that could be sold for $350.00 per issue, if used for advertising.

Dr. A. T. Kinsley, of Kansas City, gave an interesting travelogue on his visit to Europe, the past summer.

In his discussion of surgical operations on cattle, Dr. R. R. Dykstra stressed the importance of an exploratory rumenotomy in those cases where the veterinarian suspects foreign-body gastritis. Dr. Dykstra then described in detail his technic for the surgical relief of traumatic pericarditis.

Dr. S. L. Stewart, of Olathe, presented a paper, entitled, "Contagious Abortion from a Practitioner's Standpoint." He reported that he vaccinated all cows, open and pregnant, at the same time with live culture vaccine. Dr. Stewart indicated a preference for vaccinating heifers very close to breeding time, or preferably soon after pregnancy. He doubts if live culture vaccine will give the desired results when used on heifers as long as 90 days before breeding.

Dr. W. A. Browne, of Cottonwood Falls, spoke favorably of the emasculatome when used on feeder calves. He said that

bulls not only did not shrink after being emasculated, but they made a faster gain in the feed-lot than did heifers of the same type. Dr. M. L. Dietrich, of Newton, read a paper on "Fowl Paralysis," which drew out a lengthy discussion.

Dr. Chas. H. Kitselman, of Manhattan, does not believe that the Bang bacillus is responsible for undulant fever in the human. On the other hand, he condemns the porcine type of the Bang organism as being responsible for the disease.

Dr. L. F. Barthelme, of Parsons, is of the opinion that a large number of the emaciated, anemic, weakened equine patients that are presented for treatment will be found to be suffering from sclerostomiasis, particularly if a careful, clinical examination is made, together with fecal, blood and urine analyses. He considers sodium cacodylate and sodium iodid, given intravenously, as the best medicinal treatment for the destruction of the larvae present in the blood-stream.

Dr. S. R. Johnson, of Kansas City, discussed "Convulsions in Dogs." He made it clear that this nervous condition is only a symptom of some distinct disease and that practitioners should strive to find the causative agent by a process of elimination.

Officers for the ensuing year were elected as follows: President, Dr. Albert Kushner, Topeka; vice-president, Dr. W. R. Barnard, Belleville; secretary-treasurer, Dr. Chas. W. Bower, Topeka.

At the business session, Dr. R. R. Dykstra, dean of the Division of Veterinary Medicine, Kansas State Agricultural College, was unanimously endorsed as a candidate for president of the American Veterinary Medical Association.

C. W. BOWER, *Secretary.*

ARKANSAS VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Arkansas Veterinary Medical Association was held at the Marion Hotel, Little Rock, January 23, 1931. Twenty-one veterinarians were in attendance.

The meeting was opened with words of welcome by the President, Dr. Earl L. Kittrell, of Augusta. The following program was then presented:

"Control of Infectious Abortion," by Dr. W. L. Bleecker, Fayetteville.
"Municipal Meat and Milk Inspection," by Dr. R. W. Williams, Eldorado.
"Mercurochrome and Its Uses in Small-Animal Practice," by Dr. Reece Mitcham, Little Rock.
"The Value of Postmortem Examinations," by Dr. Joe H. Bux, Little Rock.

Following the noon recess, Dr. W. L. Bleecker gave a demonstration of the rapid agglutination test. Then the program was resumed as follows:

"Dourine," by Dr. R. Arbeiter, Hot Springs.
"Tetanus," by Dr. H. J. Hayes, Helena.
"Vaginal Prolapse and Cesarean Section in Canines," by Dr. C. H. Noffsinger, DeQueen.
"Swine Sanitation in Arkansas," by Dr. W. A. McDonald, Little Rock.

Officers for the ensuing year were elected as follows: President, Dr. Wm. L. Bleecker, Fayetteville; vice-president, Dr. Reece Mitcham, Little Rock; secretary-treasurer, Dr. W. C. Glockner, Little Rock.

W. C. GLOCKNER, *Secretary-Treasurer.*

MANITOBA VETERINARY ASSOCIATION

The annual meeting of the Manitoba Veterinary Association was held at the Royal Alexandra Hotel, Winnipeg, February 4, 1931. Dr. H. H. Ross, of Brandon, presided. About fifty members from all parts of the Province, were in attendance.

The report of the Secretary-Treasurer and Registrar showed the finances of the Association to be in a sound condition, with an active membership of 112.

A committee was appointed to go thoroughly into the question of municipalities being empowered to employ veterinary surgeons at a retaining fee, in order to insure the services of veterinary practitioners in every portion of the Province. A motion was passed approving the policies of the Dominion Department of Agriculture for the eradication of bovine tuberculosis, and strongly urging that these policies be developed further, with a view to the ultimate eradication of bovine tuberculosis from the country.

Progress was reported in connection with the formation of a Dominion-wide veterinary organization. Dr. J. S. Roe, of Neepawa, and Dr. W. Little, of Winnipeg, were elected honorary members of the Association.

Officers for the ensuing year were elected as follows: President, Dr. J. B. Still, Winnipeg; vice-president, Dr. J. F. Skinner, Morris; secretary-treasurer and registrar, Dr. Wm. Hilton, Winnipeg.

At the afternoon session the meeting was addressed by Mr. J. H. Evans, deputy minister of agriculture for the Province, on conditions pertaining to the live stock industry in the Province.

The following papers also were presented:

"The Practitioner and Genital Disease Control," by Dr. Alfred Savage, Manitoba Agricultural College, Winnipeg.
"The Army Veterinary Surgeon," by Lt. Col. Rene Jacques Dehault, Principal Veterinary Officer, Military District No. 10.
"Diseases Affecting Sheep," by Dr. M. T. Lewis, Provincial Department of Agriculture.

Dr. J. B. Still, Chief Veterinary Inspector, Health of Animals Branch, Winnipeg, gave a report of the sixty-seventh annual meeting of the American Veterinary Medical Association, held in Los Angeles in August, 1930. Dr. Owen McGuirk, of Dauphin, gave a review of the 1930 summer clinic held at Brandon.

WM. HILTON, *Secretary-Treasurer.*

HUDSON VALLEY VETERINARY MEDICAL SOCIETY

The regular quarterly meeting of the Hudson Valley Veterinary Medical Society was held at Jack's Restaurant, Albany, N. Y., February 11, 1931, Dr. A. Eichhorn, President, presiding.

The report of the death of Dr. V. A. Moore having just been received, President Eichhorn, after a brief eulogy, asked the members to stand as an evidence of respect.

After luncheon, attended by forty veterinarians and several ladies, Dr. H. W. Schoening, of the U. S. Bureau of Animal industry, discussed "Prophylactic Vaccination of Dogs Against Rabies." Comment on the contents of this paper is not made here, as the paper in full will be published in the JOURNAL. In answer to questions, Dr. Schoening stated that it was generally agreed among authorities that the presence of Negri bodies was evidence that the animal was affected with rabies but pointed out that failure to find such lesions should not be considered as positive evidence that the animal was not infected. It was made clear that the symptoms of rabies varied and that the so-called typical appearances of rabid animals might be absent.

After listening to Dr. Schoening's excellent paper, the meeting gave him a standing vote of thanks for his address. President Eichhorn then gave a very interesting and instructive demonstration of the short method for testing blood for Bang's disease, which was followed by many questions and opportunity for members to make the test.

A committee of three was appointed by the Chair to attend the funeral of Dr. V. A. Moore.

J. G. WILLS, *Secretary.*

MISSISSIPPI VALLEY VETERINARY ASSOCIATION

The twenty-sixth annual meeting of the Mississippi Valley Veterinary Association was held at the Galesburg Club, Galesburg, Ill., February 17, 1931. About fifty veterinarians were in attendance. Following a dinner, the members participated in a round-table discussion which included rabies, diseases of cattle and swine, and professional questions in general. Dr. W. H. Welch, State Veterinarian, was the principal speaker.

THE ONTARIO VETERINARY ASSOCIATION

The fifty-seventh annual meeting of the Ontario Veterinary Association was held on February 19, 1931, in the lecture hall of the Ontario Research Foundation. This was made possible through the kindness of Dr. H. B. Speakman, Director of the Ontario Research Foundation, who invited the Association to hold this meeting in their building. It was one of the most notable and finest of meetings held in the history of the Association, for there were eminent men in both veterinary and medical science present and taking part in the program.

The morning session commenced at 10 a. m. The President, Dr. J. E. Mumford, gave his address and the remainder of the morning was devoted to the consideration of the reports of the Secretary-Treasurer, the auditors and those of the Legislative, Educational and Resolutions committees.

At the commencement of the afternoon session, Dr. H. B. Speakman welcomed the members of the Association to his institution. Dr. E. A. Watson, Chief Pathologist of the Health of Animals Branch of the Dominion Department of Agriculture, then discussed vaccination and immunity in tuberculosis. In introducing this subject Dr. Watson referred to the many attempts made during the past forty years, to the hopes raised and the disillusions and failures which followed, and to the lesson which has to be learned, again and again, of the wily, insidious nature of tuberculous infection, the extraordinary powers of adaptation and mutation of virulence of the tubercle bacillus and the indefinite and perhaps life-long duration of infection.

Review and discussion of the BCG method of vaccination of new-born infants and calves, on which volumes of contentious literature have been published in the last year or two and which, at various international conferences and congresses, has been the subject of one of the greatest controversies ever known in

human and veterinary medicine. Surprise is expressed at the too ready and premature acceptance of the theories and assumptions of Prof. Calmette and the haste with which, in certain countries, BCG vaccination has been widely applied to babies and calves, long before it was possible to study and gauge its effects and to determine its measure of value. Canadian workers were among the first to undertake the study of Calmette's tubercle bacillus and to investigate the claims made in regard to its safety, efficacy and usefulness in vaccinating against tuberculosis.

An experimental study undertaken by the Dominion Department of Agriculture has been in progress for more than six years at the Animal Diseases Research Institute, Ottawa. In the course of this investigation it has been shown, first, that Calmette's tubercle bacillus is not the fixed virus he claims it to be, but is capable of a restoration to high virulence in the tissues of laboratory animals. Second, that the protection afforded cattle by vaccination is very limited and more or less transient and that if the vaccinated cattle are raised in a tuberculous environment and given time enough, the majority of them will develop tuberculosis to a variable extent and more or less proportionate to the severity and duration of their exposure to infection. Vaccination, moreover, tends to aggravate the "carrier problem," since the vaccinated cattle frequently become carriers and spreaders of virulent tubercle bacilli. (Even if vaccination could be made durable and efficient, would it be desirable to employ it so that the protected animals could go on excreting virulent tubercle bacilli in their milk and in other ways, and be the means of spreading infection with impunity?)

"Accidents" following the administration of BCG vaccine have been reported from several countries. At Lubeck, Germany, the death of between 70 and 80 young children from tuberculosis has occurred within a few months of BCG vaccination, and many more are reported as slightly or severely infected. Official investigation is under way and while a spontaneous rise in virulence of the vaccine is discredited, the possibility of BCG regaining virulence under laboratory conditions of cultivation is apparently recognized and left open for further investigation.

In fact, investigations conducted in North and South America and in Europe have furnished ample evidence that both in the laboratory and in the experiment animal the bacillus of Calmette-Guérin may return to high virulence. Considering all the evi-

dence, from all countries, experimental, clinical and statistical, *pro* and *con*, up to the present time, there seems every justification for challenging the safety and usefulness of BCG vaccination and of opposing the extraordinary campaign conducted by Calmette for its general application to man and animals.

Resistance, tolerance and immunity to tuberculosis are discussed from different angles. In the author's opinion there is as much fallacy as there is truth in the theories and conceptions of immunity against this disease, the assumption that "only the tuberculous can resist tuberculosis," and in vaccination with living tubercle bacilli according to such viewpoints. The immunity to infection, uncertain as it is, is at the price of infection with all its attendant risks, and of which the outcome can never be foretold. In reality, there is very little true knowledge of immunity to tuberculosis. There are hopeful signs that the old conceptions and arbitrary lines are giving way to newer thoughts and ideas, and that the intensive studies now in progress on the chemistry of tuberculosis and on the biology, instability, mutation and pathogenesis of tubercle bacilli will result in a better understanding of the problem of immunity and preventive treatment.

Dr. John R. Mohler, Chief of the United States Bureau of Animal Industry, and Dr. H. B. Speakman discussed Dr. Watson's paper.

Dr. A. D. Barbour, biochemist at the Ontario Research Foundation, reviewed briefly the six known vitamins, their properties and the results produced when foods are deficient in these substances. He also discussed the methods of making quantitative measurements of these substances. Vitamins A and D are found in large quantities in cod-liver oil. A is concerned with growth and with resistance to infection and D prevents the occurrence of rickets. Vitamin C is found notably in orange and tomato juice and is a factor concerned in the prevention of scurvy. Vitamins B and G are found in quantity in yeast but are widely distributed throughout the vegetable kingdom. Both vitamins are essential to growth. In addition, B prevents beriberi and a deficiency of G is believed to be the cause of pellagra. Vitamin E is found in vegetable oils generally, and in large amount in wheat-germ oil. It is essential for normal reproduction.

Dr. F. J. Cote, of Guelph, spoke on "Bovine Hemoglobinuria (Redwater in Cattle)." Though this disease has existed for a

long time in Ontario, little attention has been paid to it until lately. This form of redwater differs from other forms, such as the well-known Texas fever. There is another form of redwater which is due to hemorrhage from the bladder but this is quite distinct from the condition found in Ontario. The symptoms of the disease are the emission of red urine lasting for several days. This is followed by a profound anemia, the animal taking a long time to return to normal condition, which means a loss of flesh and lowered milk yield. It is not uncommon in the Province and is a disease in which further research is required.

Dr. Seymour Hadwen discussed the pathology and blood changes in this disease. Dr. Ronald Gwatkin reported on the bacteriology of the condition and Dr. J. C. Brown stated that in a survey of a small area of the Province he found that 51 out of 227 animals had been affected at one time or another. On certain farms it has been known to recur for many years. It is probable that there are several such areas in Ontario.

Dr. R. A. McIntosh, of the Ontario Veterinary College, spoke on the prevention and treatment of hemorrhagic septicemia. This disease is quite prevalent in Ontario. Dr. McIntosh warned against the indiscriminate use of biological preparations. Vaccination without careful consideration of the condition of the animal is fraught with danger. Three biological preparations are employed. These are aggressin, bacterin and serum. The aggressin is indicated for the protection of healthy animals that have not been exposed to infection. The bacterin may be similarly employed. Serum is indicated in actual outbreaks as a temporary protective measure and in the treatment of infected animals.

The disease occurs most frequently in the fall and spring. Animals subjected to shipping are apparently most susceptible, for many outbreaks follow the shipment of cattle from one place to another. In some districts and on some farms the infection appears to be indigenous and spontaneous outbreaks occur. Dr. McIntosh dealt with methods of handling and preventing this disease under various conditions.

Dinner was provided at Hart House, University of Toronto. Seated at the head table were Dr. John R. Mohler, Hon. T. L. Kennedy, Minister of Agriculture, Mr. J. B. Fairbairn, Deputy Minister of Agriculture, Dr. F. G. Banting, Dr. J. G. Fitzgerald, Dr. Oskar Klotz, Dr. E. A. Watson, Dr. C. D. McGilvray, Dr. S. Hadwen and others.

Brief after-dinner addresses were given by Hon. T. L. Kennedy and Dr. C. D. McGilvray, and then the meeting adjourned to the foundation for Dr. Mohler's address on "Research on Bovine Infectious Abortion."

Dr. Mohler spoke on the work of the Bureau in this regard and of the institutions associated with the Bureau in this work. While the mouth is usually considered the principal avenue of entrance, the eye and skin have recently come in for more attention. The importance of bovine and porcine types is receiving attention. The blood of swine was found to be infected as long as 19 days after infection by the conjunctiva. Work is being done in connection with the diagnosis of udder infection by the titre of the blood serum. A whole-blood test is being developed which can be carried out on the premises. This worked well in the summer but not so well in the winter, for reasons not yet determined. Chemotherapy is receiving attention, but so far has shown no promise. The stability of types is being studied. A swine type has not changed after three years in the udder of a cow. Artificial plots have been found to be free from infection in less than a month. This work is being continued under varying conditions.

Eradication measures under various conditions are being tried. The two-unit herd system is working out very well. In some cases spread of infection is too rapid or there are too many reactors. Dr. Mohler considered that work on the blood tests was highly important. Vaccination as generally used has not proved to be dependable but has given enough encouragement to warrant further experimentation. It will be continued until proved useful or useless. Calfhood vaccination is in the experimental stage but appears promising. Animals have been carried through three pregnancies and compared very favorably with the unvaccinated controls. Dr. Mohler referred to the fourteen state projects being carried on in conjunction with the Bureau.

The election of officers for the ensuing year resulted as follows: President, R. Gwatkin; first vice-president, W. Moynihan; second vice-president, H. E. Batt; Executive Committee, W. J. R. Fowler, A. H. McLeod, G. S. Muir, D. C. Tennent; secretary-treasurer, H. M. LeGard.

The arrangement of the program was under the supervision of Drs. Gwatkin, Hadwen and Moynihan and they were complimented on the splendid meeting which was provided.

R. A. McIntosh, *Reporter.*

CENTRAL CANADA VETERINARY ASSOCIATION

The annual meeting of the Central Canada Veterinary Association was held Feb. 25, 1931, in the Chateau Laurier, Ottawa. It was made up of two sessions, the morning and afternoon, the morning session being devoted to business.

In the afternoon, five technical papers were presented. Dr. P. J. G. Plummer, of the Animal Diseases Research Institute, presented a paper on "Suggestions for the Selection and Preservation of Specimens for Laboratory Examination." In this was pointed out the proper material to collect and the manner in which such materials should be shipped to the laboratory for examination. A detailed account was given of the steps to take for the preservation and packing of specimens.

Dr. A. L. McNabb, Director of Laboratories, Provincial Department of Health, Toronto, presented a paper on "Epidemic Sore Throat with Especial Reference to Udder Disease of Cattle." This was a masterly paper and presented in detail the information in respect to this subject and in addition gave the experimental work which has been conducted in his laboratories on an outbreak of epidemic sore throat which originated from udder disease.

Dr. Norman MacL. Harris, Director of the Laboratory of Hygiene, Department of Health, Ottawa, gave a splendid address on "Psittacosis" (parrot disease). In this address the symptoms, pathology, and bacteriological findings were reviewed.

"Calcium Gluconate in the Treatment of Parturient Apoplexy" was the subject of a paper prepared by Dr. R. L. Conklin, of MacDonald College, P. Q. The history of milk fever was reviewed and the different methods of treatment discussed. The use of calcium gluconate and the manner in which it corrects the physiological disturbance which results in milk fever was very carefully gone into.

Dr. George Hilton, Veterinary Director General, Ottawa, gave a paper on the "International Veterinary Congress, 1930." In his paper Dr. Hilton mentioned the different diseases which had been discussed at the Congress and the different veterinarians with whom he met. Following this paper the meeting adjourned.

In the evening a banquet was held in the Quebec Suite of the Chateau Laurier, the guest of honor being Prof. J. G. FitzGerald, Director of School of Hygiene, Connaught Laboratories, Toronto. Following the toast to "The King" and also one to

"The Medical Profession", Prof. FitzGerald was introduced. The theme of his address was the close relationship that exists between human and comparative medicine. Prof. FitzGerald pointed out the importance of a profound knowledge of the subjects that make up the science of medicine, such as physiology, biochemistry, pathology, etc. He expressed the belief that it would be better if students of human and veterinary medicine were taught the basic subjects together. Not only would this give a thorough grounding but it would make for a correlation and closer coöperation between the two great branches of medicine. Following Professor FitzGerald's address, Dr. E. A. Watson, Chief Pathologist, moved a vote of thanks, which was extended to the speaker of the evening.

CHAS. A. MITCHELL, *Secretary-Treasurer.*

KANSAS CITY ASSOCIATION OF VETERINARIANS

The regular monthly meeting of the Kansas City Association of Veterinarians was held at the Hotel Baltimore, Kansas City, March 10, 1931, with thirty members in attendance.

A general discussion of the present situation relative to the inspection of dairy herds supplying milk to Kansas City was the principal topic of the program. Mr. O. C. Murphy, of the Kansas City Health Department, gave a short talk on his side of the problem. Many interesting side-lights came to the surface, especially pertaining to the testing of herds for Bang's disease. The Health Department is attempting to start a clean-up of the herds supplying raw milk, and hopes eventually to have these herds composed only of negative cows, as far as Bang's disease is concerned. The local veterinarians are being confronted with the usual problems when such an undertaking is considered. The Health Department is leaving the work of collecting blood samples and having the tests made, up to the practitioner. When reactors are found, it is the intention of the Health Department to follow up these animals and determine whether they are dangerous to the raw milk supply, until such time as all reactors can be eliminated from these herds.

The April meeting was held at the hospital of Dr. H. M. McConnell, at Independence, Mo., April 14, 1931. Thirty-five veterinarians and fifteen ladies attended the meeting. The latter were entertained by Mrs. McConnell, while the veterinarians spent a very profitable evening listening to a program devoted

largely to small-animal practice, furnished by Dr. E. J. Frick, of Manhattan, Kans. Dr. Frick discussed several important subjects and a general round-table discussion of practical problems followed.

J. D. Ray, *Secretary.*

CENTRAL WISCONSIN VETERINARY ASSOCIATION

A meeting of the Central Wisconsin Veterinary Association was held at the Woodland Hotel, Owen, Wis., March 18, 1931. Following a dinner at 6 o'clock, Drs. B. A. Beach and W. Wisnicky, both of Madison, discussed matters of interest to the local veterinarians.

This association was re-organized in December, at which time officers were elected as follows: President, Dr. M. L. Claflin, Neillsville; vice-president, Dr. W. W. Payne, Colby; secretary, Dr. W. F. Nolechek, Thorp; treasurer, Dr. A. J. Abbott, Marshfield.

OHIO STATE UNIVERSITY VETERINARY CONFERENCE

The sixth veterinary conference sponsored by the College of Veterinary Medicine, Ohio State University, was held at the University, March 18-19-20, 1931.

The first speaker was Dr. Maurice C. Hall, Chief, Zoological Division, Bureau of Animal Industry, Washington, D. C. Dr. Hall presented the subject, "Parasites of Dogs and Cats," in his usual interesting manner. The attendance and interest shown in the discussion was an indication of the importance of the subject at this time.

Dr. Clayton McPeek, Department of Physiology, College of Medicine, Ohio State University, presented a subject not commonly seen on veterinary programs, "The Use of the Ultra-Violet Lamp." Dr. McPeek covered the subject in a very effective manner. Many seemed impressed with the possibilities of this kind of therapy as it might be applied to animals.

Dr. W. J. Lentz, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa., was the last speaker of the morning. His subject, "Some Observations in Small Animal Practice," was particularly adapted to the kind of talk that Dr. Lentz' audiences always enjoy. Many practical ideas were given and an instructive discussion followed.

During the first afternoon session, two sections were conducted. In the section devoted to small animals, Dr. F. E. McClelland, who is engaged in practice at Buffalo, N. Y., delivered a paper on "The Treatment of Fractures." This was followed by some practical demonstrations and considerable discussion. Dr. McPeek followed with a most instructive talk on "The Use of the Ultra-Violet Lamp in Practice." His practical knowledge of the subject, his very fine way of explaining the uses of the lamp, and the asking of numerous questions helped materially in the success of this program.

Dr. W. J. Lentz, assisted by Dr. J. N. Shoemaker, used the remainder of the period in the diagnosis and discussion of a number of cases which were available in the hospital. There seemed to be plenty of interest in the subjects pertaining to small animals as was shown by an attendance of about eighty.

The section on sheep and swine, during the same afternoon, was well attended. Dr. H. W. Turner, Pennsylvania Bureau of Animal Industry, Harrisburg, Pa., gave an intensely interesting talk on "Diseases of Sheep." The discussion which followed was very ably led by Dr. P. T. Engard, of Marysville, Ohio.

"Diseases of Swine" was the second subject of the session, and was presented by Dr. John O. F. Price, U. S. Bureau of Animal Industry, Algona, Iowa. The discussion was led by Dr. J. B. Hollenbeck, U. S. B. A. I., Columbus, Ohio.

Dr. Maurice C. Hall supplied a very fine climax to the program of this session by a talk on "Parasites of Sheep and Swine."

The first speaker on the Thursday morning program was Dr. E. B. Ackerman, of Huntington, L. I. There is a feeling that the horse has of late been somewhat neglected, so it was a distinct pleasure to have the subject of "Equine Practice" presented by one so well fitted to do the subject justice.

"The Pleasure Horse Situation in Ohio," also a very timely subject, was presented by Dr. W. F. Guard, College of Veterinary Medicine, who was never at a loss for something instructive to say.

Dr. E. B. Ackerman pleased the audience so well during the early part of the session that there was no hesitancy in calling upon him again for a talk on "Lameness."

Dr. Maurice C. Hall completed the program of the morning by giving a very inspiring talk dealing with "Veterinary Education," and matters pertaining to the American Veterinary Medical Association.

The Thursday afternoon session was opened by Dr. W. P. S. Hall, Chief of the Bureau of Foods and Drugs, Division of Health, Toledo, Ohio, by the delivery of a very fine talk on the live subject of "Milk Inspection."

"The Dairyman's Problems in the Production and Handling of Dairy Products," was the subject presented by Mr. Charles L. Blackman, Agricultural Extension in Animal Husbandry, Ohio State University. Mr. Blackman is a very forceful speaker and the subject was approached in such a way as to tend to increase the understanding between the veterinarian and the dairyman.

Preceding a fifteen-minute recess, President George W. Rightmire of Ohio State University, gave a short address of welcome.

The next speaker, Dr. L. Van Es, Department of Animal Pathology and Hygiene, University of Nebraska, Lincoln, Nebraska, was very heartily received. His talk on "The Basis and Scope of Animal Hygiene" was very much appreciated.

"The Veterinarian in Public Health Service" was the subject presented by Dr. A. F. Schalk of the College of Veterinary Medicine. Dr. Schalk covered the subject in such a way that it served to emphasize the relation of the profession to the public health.

Dr. Willard L. Boyd, of the University of Minnesota, was the first speaker on the Friday morning program. He delivered a paper on "Milk Fever and Like Conditions." which was very enthusiastically received. Later in the morning he discussed the subject of "Breeding Problems."

Dr. D. H. Udall, Department of Medicine, New York State Veterinary College, Cornell University, appeared twice upon the morning program. "Diseases of the Udder" was his first subject and "Diseases of the New-born Calf," the second. Only Dr. Udall could have made the presentation of these subjects in this way. The subjects were timely and very much appreciated.

Friday afternoon was devoted entirely to a large-animal clinic. The subjects of demonstrations were as follows: "Hypoglycemia in the Cow," "Handling and Medicating Sheep," "Technic in Treating Lameness," "Testing for Mastitis," and "The Use of the Stomach-Tube in the Ox." Those who took part in the clinic were Drs. Boyd, Turner, Ackerman, Udall and Guard.

The total attendance at the conference was 277. Of this number, 231 were from Ohio. Twelve other states were represented.

The college is very appreciative of the splendid attendance at all sessions and of the fine interest shown in various ways. It is also mindful of the generosity of the speakers and all others who may have contributed in any way.

W. R. HOBBS, *Reporter.*

ILLIMO VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Illimo Veterinary Medical Association was held at the hospital of Dr. A. A. Moore, Edwardsville, Ill., March 26, 1931. About fifty members were in attendance. A clinic was held during the morning. At the literary program, in the afternoon, Dr. J. S. Koen, of Bloomington, and Dr. H. R. Schwarze, of East Saint Louis, were the principal speakers.

Officers for the year were elected as follows: President, Dr. H. J. Schlesinger, New Athens; vice-president, Dr. L. J. Miller, Waterloo; secretary, Dr. H. R. Schwarze, East Saint Louis; treasurer, Dr. Wm. Beckman, Saint Louis, Mo.

J. T. BROWN, *Secretary.*

SOUTHWESTERN MINNESOTA VETERINARY MEDICAL ASSOCIATION

About eighty veterinarians gathered at the Crystal Cafe, Springfield, Minn., the evening of April 2, 1931, and organized the Southwestern Minnesota Veterinary Medical Association. After partaking of one of the world-famous Springfield sauerkraut dinners, the group adjourned to the City Hall for a business meeting and literary program. After discussing matters of general interest to the veterinarians in this territory, the meeting was addressed by Dr. Thomas W. Munce, of the Allied Laboratories, who presented a general résumé of the hog cholera situation. His paper was very well prepared and was very interestingly presented. Dr. Munce emphasized the salient points pertaining to clinical and postmortem diagnosis, differential diagnosis, the care and treatment of hogs after receiving serum-virus immunization, and other important details. In a second paper presented by Dr. H. C. H. Kernkamp, Associate Professor of Veterinary Medicine, University of Minnesota, the author discussed diseases of baby pigs, with particular reference to the so-called "anemia complex."

The officers of the new association are as follows: President, Dr. Philip H. Radford, Slayton; vice-president, Dr. G. Van Duzee, Lamberton; secretary-treasurer, Dr. J. J. Kelly, Marshall.

CENTRAL MISSOURI VETERINARY MEDICAL ASSOCIATION

The regular spring meeting of the Central Missouri Veterinary Medical Association was held at the Hotel Bothwell, Sedalia, April 10, 1931. The members assembled at six o'clock and retired to a private dining-room where supper was served. The program followed immediately with Dr. J. H. Slater, of Carrollton, presiding.

Dr. C. D. Folse, of Kansas City, Kans., gave a short talk on "Correct Publicity for the Veterinary Profession." Dr. H. J. Hearrington, of Lexington, Mo., presented "Internal Parasites of Cattle." Dr. A. Goodlive, of Marshall, Mo., discussed "Internal Parasites of Equines." Each of these subjects brought forth much valuable information and a good discussion.

Officers for the ensuing year were elected as follows: President, Dr. H. J. Hearrington, Lexington; vice-president, Dr. C. H. Honeywell, Slater; and secretary-treasurer, Dr. C. N. Hutcherson, Clinton.

J. D. RAY, *Reporter.*

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was held March 4, 1931, in the Academy of Medicine Building. Dr. O. E. McKim called the meeting to order and introduced Col. Rhoades, Corps Area Surgeon, who gave a brief outline of the duties of army veterinarians, in peace and war. In peace the duties are similar to those of private practice, but in war, prevention of the spread of diseases, and the rapid return of injured animals to their stations are of paramount importance. Animals badly injured and which would recover if given time and attention, in war are destroyed, as efforts are made to save only animals which can enter the replacement strings within two months. As there are 91,000 animals in an army corps, and all animals working under high pressure, with little food or rest, the turn-over in animals is exceptionally heavy. On closing his address, Col. Rhoades spoke of the necessity for Reserve Corps training, as the Organized Reserves are the keystone of national defence.

Capt. H. M. Savage, V. C., followed Col. Rhoades and gave in detail the duties of the veterinarians in garrison, on the march and

in combat, and covered the duties of the unit, divisional and corps veterinarians. A rising vote of thanks by the members was extended to Col. Rhoades and Capt. Savage.

Drs. Woodward, Cox and Goldbrowne were elected to membership.

Resolutions on the deaths of Dr. V. A. Moore and Dr. P. A. Fish were read and copies were sent to the families and the A. V. M. A. and spread upon the minutes.

The President read a copy of the letter he wrote the Commissioner of Health, Dr. H. P. Wynne, inviting him to address the meeting and state his reasons for his recent pronouncement in the papers.

No further business appearing, the meeting adjourned.

DR. J. E. CRAWFORD, *Secretary.*

Illinois Veterinarians to Meet at Springfield

Secretary Lacroix is making plans for a record-breaking meeting of the Illinois State Veterinary Medical Association, at Springfield, May 27-28. Contributors to the program will include Dr. Maurice C. Hall, president of the A. V. M. A., and Dr. Louis D. Mersch, executive secretary of the Iowa Veterinary Medical Association. Headquarters will be at the St. Nicholas Hotel. A special program for the ladies will be provided by the local Committee on Arrangements.

Sioux City Horse Market Strong

Dr. G. P. Statter, of Sioux City, Iowa, reports that on April 16, at a special spring sale, the Sioux City Horse and Mule Company sold 300 horses at very satisfactory prices. Heavy draft horses sold up to $235.00. There were ten buyers from Boston, New York, and points in Wisconsin and Michigan, who bought one or two carloads of the tops. There is a strong market demand for a good class of farm horse weighing around 1400 to 1600 pounds.

STATE BOARD EXAMINATION

Nebraska State Board of Veterinary Examiners. Capitol Bldg., Lincoln, Nebr. June 23-24, 1931. Dr. F. R. Woodring, Secretary, Capitol Bldg., Lincoln, Nebr.

NECROLOGY

HAROLD EDWARD BEMIS

Dr. Harold E. Bemis, Professor of Veterinary Surgery and Obstetrics, and dean of the School of Veterinary Medicine, University of Pennsylvania, died at his home in Bywood Manor, Pa., April 4, 1931, after an illness of about one week. He suffered an attack of influenza followed by pneumonia.

Born at Cawker City, Kansas, June 3, 1883, Dr. Bemis attended local schools and then entered Northwestern University.

DR. H. E. BEMIS

After spending two years at the latter institution, he transferred to Iowa State College and took one year of agriculture, before deciding to study veterinary medicine. He finished his course in veterinary medicine in 1908 and entered the service of the U. S. Bureau of Animal Industry, at Chicago. After spending one year in this work, he decided to return to Iowa State College. In 1911 he was appointed head of the Department of Surgery, and in 1915 was appointed vice-dean of the Division of Veterinary Medicine. He continued in both of these capacities until 1927,

when he resigned to accept an appointment to the chair of veterinary surgery and obstetrics at the University of Pennsylvania, succeeding the late Dr. John W. Adams. In 1930, he was appointed dean, following the resignation of Dr. Louis A. Klein.

The following record of the military service of Dr. Bemis is taken from "History of Veterinary Medicine at Iowa State College," by Dr. C. H. Stange:

> Dr. Bemis had an enviable record during the World War. He entered the Veterinary Corps with the rank of Major at Camp Funston, Kans., October 4, 1917. He acted as division veterinarian to the Eighty-ninth Division, and on January 3, 1918, was transferred to Veterinary Hospital No. 3, at Camp Lee, Va. On September 1, 1918, he was assigned to the office of chief veterinarian, A. E. F., at Tours, France. On November 18, 1918, Dr. Bemis was assigned to the position of chief veterinarian, 3rd Army Headquarters, Coblenz, Germany. He saw eighteen and one-half months of foreign service and made a fine record. During this service he was promoted to the rank of Lieutenant-Colonel. He received his discharge at Washington, D. C., June 24, 1919. The decoration, "Officer du Mérite Agricole, Republique de France," was awarded Dr. Bemis by the Republic of France for work done in reclaiming diseased and debilitated horses after the Armistice, so they could be returned to agricultural service.

Dr. Bemis joined the A. V. M. A. in 1911, and took a prominent part in the activities of the national organization. He was a member of the first Executive Board (1916-17), representing District No. 5, which was at that time District No. 4. His passing leaves Dr. John R. Mohler as the only surviving member of the first Executive Board provided under the present Constitution and By-laws. Dr. Bemis was a member of the Special Committee on Army Veterinary Service, 1916-17; a member of the Audit Committee, 1919-21; chairman of the Section on General Practice, 1919-20; chairman of the Committee on Necrology, 1921-22; chairman of the Local Committee on Arrangements for the Des Moines meeting in 1924; and chairman of the Committee on Education 1928-31. In the latter capacity Dr. Bemis had been collaborating with the Rockefeller Foundation in a survey of veterinary education in the United States. He was the author of numerous articles in the field of veterinary surgery and had made valuable contributions to our knowledge of local anesthesia, especially nerve-blocking, in surgical operations on large animals.

Services were conducted at the home, on Sunday, April 5. Brief addresses were made by Provost Penniman, of the University of Pennsylvania; Dr. J. H. McNeil, of Trenton, N. J.; and Dr. Raymond A. Pearson, president of the University of Maryland. The latter paid the following tribute to Dr. Bemis:

He was frank in his dealings. His sincerity and his friendship were 100 per cent. He was mild in manner and kindly yet red-blooded and manly. His ambition for his profession and his School was the highest. It did not include a selfish motive—it was for his professional brothers and for better live stock which means better agriculture and a stronger nation. His beautiful home life is too sacred to mention at this time.

I cannot believe that it would be the will of Him whom we worship to remove such a person and such a spirit from his happy and busy world but that in some way one of God's laws was accidently broken and the penalty was paid just as when a human life is taken by fire or flood or collision or earthquake. Though there is gladness in Heaven there must be mourning also for the loss suffered by the family and countless others whose lives will be affected.

A nobleman and a christian gentleman has fallen. Beautiful and sacred memories remain and always will be treasured by those who knew and loved him and always will be an inspiration to them.

Interment was in the Iowa State College Cemetery, at Ames, Iowa, in the shadows of the institution where he had been a student and teacher for so many years. Besides his widow, two young daughters survive.

HOMER ORVILLE KEYES

Dr. Homer O. Keyes, of Los Angeles, California, died January 5, 1931, at the Veterans' Hospital, Sawtelle, Calif.

Born at Holdridge, Nebraska, July 9, 1892, Dr. Keyes attended local grade and high schools at Summer Hill and Rockport, Ill. His veterinary training was secured at the Kansas City Veterinary College. Following his graduation in 1913, he entered private practice at Salida, Colo. Later he entered the service of the U. S. Bureau of Animal Industry and was assigned to meat inspection, first at Kansas City and later at Chicago, Ogden, Utah, and Tacoma, Wash. He was also assigned to field inspection work at various points.

During the late war Dr. Keyes was a first lieutenant in the Veterinary Corps and was stationed at Camp Humphreys, Va. For a time he was in the employ of the California State Department of Agriculture, and was stationed at Bakersfield and Paso Robles on meat inspection. In 1927 he accepted a position with Los Angeles County and was engaged in meat inspection. In 1930 he took up the same work for the City of Los Angeles.

Dr. Keyes joined the A. V. M. A. in 1928. He was a member of the California State Veterinary Medical Association and the Southern California Veterinary Medical Association. He was a member of Alpha Psi Fraternity, a life member of the Scottish Rites Masons (Tampa, Fla.), a Knight Templar and a Shriner. He is survived by his mother and two sisters.

C. E. W.

FRANK J. SCHELOSKI

Dr. Frank J. Scheloski, of Knoxville, Tenn., died at Fort Saunders Hospital, Knoxville, March 24, 1931, after a long illness. He was born at Kansas City, Kansas, March 6, 1890, and was a graduate of the Kansas City Veterinary College, class of 1911. He was employed by the U. S. Bureau of Animal Industry for a number of years, his last assignment having been at the East Tennessee Packing Company plant, at Knoxville. Previous assignments included Kansas City, Milwaukee and Chicago.

Dr. Scheloski joined the A. V. M. A. in 1918. During the late war he was stationed at Auxiliary Remount Depot No. 306, Camp Greene, North Carolina. He was a member of the National Association of B. A. I. Veterinarians. Surviving him are his widow, his father, four brothers and three sisters. Interment was at Kansas City, Kansas.

HAROLD A. GREAVES

Dr. Harold A. Greaves, of Glenwood, Minn., died March 26, 1931. He had been ill for about a month. Influenza, superimposed on an old heart lesion, was the cause of death.

Born at Northfield, Minn., September 16, 1886, Dr. Greaves attended local schools and the School of Agriculture, University of Minnesota (1905). His veterinary education was obtained at Ohio State University. Upon his graduation in 1911, he returned to Minnesota and located at Melrose. Several years later he removed to Glenwood, where he practiced until his death. In 1920 he was elected mayor of Glenwood and served two years.

Dr. Greaves joined the A. V. M. A. in 1919. He was a member of the Minnesota State Veterinary Medical Society and served as president for 1920. He was a member of Alpha Psi Fraternity and served as vice-president (1909-10) and president (1910-11) of Alpha Chapter at Ohio State University. Dr. Greaves had been a member of the Minnesota State Live Stock Sanitary Board for six years, having recently been reappointed by Governor Olson.

Surviving Dr. Greaves are his widow (née Emily E. Brown) and three daughters.

GEORGE WALTER SMITH

Dr. George W. Smith, of Hoboken, N. J., died at his home, April 1, 1931, after a short illness due to pneumonia.

Born in Jersey City, N. J., April 27, 1876, Dr. Smith was educated at St. Peter's Preparatory School and St. Francis Xavier College, New York City. His veterinary education was received at the New York-American Veterinary College. He was graduated with the class of 1903. Dr. Smith was engaged in general practice in Hoboken, and was city veterinarian. He was also associated with his brother, Dr. Thomas E. Smith (N. Y. C. V. S. '97), city veterinarian of Jersey City.

Dr. Smith joined the A. V. M. A. in 1911. He was also a member of the Veterinary Medical Association of New Jersey and of Hoboken Council Knights of Columbus. He was a former president of the New Jersey State Board of Veterinary Medical Examiners.

Surviving Dr. Smith are his widow, (neé Henrietta C. Taylor), two sons, two daughters, four brothers and one sister, who was his twin. A large delegation of veterinarians attended the funeral.

M. V. BYERS

Dr. M. V. Byers, of Homer, Nebr., died at his home, December 15, 1930, of pneumonia. He was a graduate of the Iowa Veterinary College, of Des Moines, class of 1894. He practiced for a number of years at Osceola, Nebraska. Later he was a field veterinarian in state employ. He leaves a widow, three sons and one brother.

FRED U. BALMER

Dr. Fred U. Balmer, a graduate of Berne, died at his home in McKees Rocks, Pa., January 11, 1931. He came to the United States in 1908 and located at Bremen, Ind. He participated in the late war and was cited for bravery during his service in France, the citation being signed by General John J. Pershing. At the close of the war he returned to Bremen, and in 1926 he removed to McKees Rocks, where he was employed by the Shoen Pressed Steel Car Works.

HUGH A. SUTHERLAND

Dr. Hugh A. Sutherland, of Ashtabula, Ohio, died at his home, January 25, 1931. He had been ill about three months and death resulted from cerebral hemorrhage.

Born in Wellington County, Canada, July 3, 1855, he came to the United States as a child, when his parents moved to Ashtabula

County, Ohio. He attended the Ontario Veterinary College and following his graduation, in 1891, he located at Andover, Ohio. In 1899 he removed to Ashtabula and practiced there until his final illness.

Surviving Dr. Sutherland are one son, two step daughters, two brothers and three sisters.

DILLON S. BROWN

Dr. Dillon S. Brown, of Genoa, Ill., died at his home, January 23, 1931, after an illness of two years. He was born in Genoa, May 12, 1852, and lived there practically all his life. He attended local schools and then entered the University of Illinois. He was graduated in 1875 and then entered the Montreal Veterinary College (McGill University). Following his graduation in 1877, Dr. Brown located at Sycamore, Ill., but practiced veterinary medicine only two or three years. He entered the mercantile field at Genoa and later established a bank there, which later became the Genoa Exchange State Bank.

Besides his widow, one son survives.

E. B. RADER

Dr. E. B. Rader, of Oxford, Iowa, died at his home, January 31, 1931. He was a graduate of the McKillip Veterinary College, class of 1908, and had been located at Oxford ever since his graduation.

EDWIN J. BANZHAF

Dr. Edwin J. Banzhaf, since 1910 an Assistant Director in the New York City Department of Health Research Laboratory, died March 17, 1931, at the age of fifty-three. He was an outstanding authority on the production of biological products and particularly the refining and concentration of anti-sera. During recent years he had devoted much time to the problem of eliminating the chill-producing substances from antipneumococcic serum.

L. H. PAMMEL

Dr. L. H. Pammel, professor of botany at Iowa State College since 1889, died March 23, 1931, in his 69th year. Dr. Pammel gave the first course in bacteriology offered to veterinary students. Later he offered a course on poisonous plants to veterinary

students, and this eventually became the book, "Manual of Poisonous Plants," familiar to all veterinarians. In his "History of Veterinary Medicine at Iowa State College," Dr. C. H. Stange paid the following tribute to Dr. Pammel: "Veterinary Science has received a rich contribution through the services of Dr. Pammel."

DEAN O. HERRON

Dr. Dean O. Herron, of Cleveland, Ohio, died at his home, March 26, 1931, following an illness of several years due to heart trouble. He was born at Sherrodsville, Ohio, in 1887, and was a graduate of the Cincinnati Veterinary College, class of 1912. He was in the employ of the U. S. Bureau of Animal Industry practically since graduation, and was a member of the National Association of B. A. I. Veterinarians. He is survived by his widow, one son, one daughter, his father and one brother.

WILLIAM H. TURNER

Dr. William H. Turner, of Amherst, Ohio, died at his home, March 30, 1931, following a stroke of paralysis three days previously. He was a graduate of the Ontario Veterinary College, class of 1890, and practiced until about four years ago. He was a great lover of horses and owned many well-known trotters at various times.

Dr. Turner was a member of the Ohio State Veterinary Medical Association. His fraternal affiliations included the Elks Lodge of Lorain, Stonington Lodge, F. and A. M., and Stone City Lodge of the Eastern Star. Surviving Dr. Turner are his widow, one son, two daughters and one sister.

HENRY JACOB MAU

Dr. H. Jacob Mau, of Herscher, Ill., died at his home, March 30, 1931, following a lingering illness. Born in Pilot Township, Kankakee County, Illinois, July 23, 1869, Dr. Mau studied veterinary medicine at the Chicago Veterinary College. Following his graduation in 1905, he returned to Herscher and entered general practice, continuing until his death. He is survived by his widow, two sons, one daughter, one brother and one sister.

F. E. BARNETT

Dr. F. E. Barnett, of Painesville, Ohio, died at his home, April 14, 1931. He was born at West Salem, Ohio, June 29, 1858, and had practiced at Painesville ever since his graduation from the Ontario Veterinary College, in 1889. He was a member of the Ohio State Veterinary Medical Association. Besides his widow, Dr. Barnett is survived by one son, one daughter and one brother.

GEORGE C. BOWEN

Dr. George C. Bowen, of New Hyde Park, L. I., N. Y., died of heart disease, April 17, 1931, aged 62 years. He was born in England and was a graduate of the Ontario Veterinary College, class of 1897. He had practiced in New Hyde Park ever since his graduation. He leaves his widow, one son and two daughters.

M. J. REINHARD

Word was received only recently of the death of Dr. M. J. Reinhard, of Green Bay, Wis., July 9, 1930, after an illness of nine months, due to heart trouble. He was a graduate of the Grand Rapids Veterinary College, class of 1907. He was 48 years old and is survived by his widow, two daughters and one son.

Our sympathy goes out to Dr. C. F. Harrington, of Mitchell, S. Dak., in the loss of his wife, about the middle of March; to Dr. R. S. Shipp, of Cameron, Mo., in the death of his wife, December 25, 1930; to Dr. and Mrs. J. P. Guffey, of Sutherland, Nebr., in the death of their son, Robert, January 5, 1931.

PERSONALS

MARRIAGES

Dr. William B. Whyte (Ont. '24), of Highland Park, Mich., to Miss Gladys Bledsow, of Detroit, Mich., December 24, 1930, at Bowling Green, Ohio.

Dr. T. L. Tierney (St. Jos. '20), of Walnut, Iowa, to Miss Laura Thiessen, March 9, 1931.

Dr. D. C. Grinnell (McK. '11), of Waukegan, Ill., to Miss Blanche Osborne, of Libertyville, Ill., April 15, 1931, at Libertyville, Ill.

BIRTHS

To Dr. and Mrs. Bernard Mann, of Philadelphia, Pa., a son, March 27, 1931.

To Dr. and Mrs. O. Bruce Gochnauer, of Minneapolis, Minn., a son, Delroy Bruce, March 16, 1931.

To Dr. and Mrs. J. N. Jerome, of Urich, Mo., a daughter, Faunta Mae, March 14, 1931.

To Dr. and Mrs. Franklin H. Suits, of Odessa, Mo., a son, Irvin Urton, March 11, 1931.

To Dr. and Mrs. F. R. Beaudette, of New Brunswick, N. J., a son, Thomas Rivers, February 7, 1931.

To Dr. and Mrs. Louis H. Smith, of Burlington, Kans., a daughter, Carol Ann, February 17, 1931.

PERSONALS

Dr. H. N. Waite (Chi. '15) has removed from Corsica, S. Dak., to Belvidere, S. Dak.

Dr. B. Hickman (Chi. '10) located at West Point, Ind., for general practice, March 1.

Dr. Harry Kline (U. P. '17) has removed from Elmhurst, Long Island, N. Y., to Gayhead, N. Y.

Dr. L. L. Menke (O. S. U. '16), of Hempstead, Texas, is a breeder of Hereford and Brahma cattle.

Dr. W. S. O'Neal (K. S. A. C. '26), of Saint Charles, Mo., was elected mayor at the recent municipal election.

Dr. A. D. Knowles (K. C. V. C. '06), formerly located at Kelsey City, Fla., is now at West Palm Beach, Fla.

Dr. D. H. Siress (T. H. '13), of Murray, Ky., has been appointed to conduct tuberculin testing in Trigg County.

Dr. A. O. Haverfield (O. S. U. '26), formerly of Cadiz, Ohio, has located at Steubenville, Ohio, for general practice.

Dr. Robert Learmonth (Mich. '25) has resigned his position at the Rhode Island Agricultural Experiment Station.

Dr. Ray Kelly (K. C. V. C. '11) reports a change of address from Bunceton, Mo., to 502 Jefferson Ave., Clinton, Mo.

Dr. W. Vance Stevens (O. S. U. '30), formerly of Mount Vernon, Ohio, is now engaged in general practice at Holgate, Ohio.

Dr. L. J. O'Reilly (Chi. '12), of Merrill, Wis., is registrar of the American National Fox and Fur Breeders Association.

Dr. E. E. Burdick (Ont. '96), of Huron, S. Dak., who was very sick during the past winter, is now back in practice again.

Dr. Donald B. Palmer (Iowa '11), of Minneapolis, Minn., announced the opening of an office at Wayzata, Minn., April 1.

Dr. James T. Mills (K. C. V. C. '16) reports a change of address from Hot Springs, Ark., to 110 Chestnut St., Camden, Ark.

Dr. Leland C. Morley (Iowa '30) has been taking postgraduate work at the Virginia Polytechnic Institute, during the past year.

Dr. George Pierce (O. S. U. '09), of Marion, Ohio, has been appointed state veterinarian of Ohio, succeeding Dr. C. McCandless (Chi. '15).

Dr. R. F. Vermilya (Chi. '06) has been appointed secretary of the Executive Committee of the Federal Business Mens Association, of Detroit.

Dr. E. H. Liebenstein (Gr. Rap. '17), of Sheboygan, Wis., has taken over the practice of his father, the late Dr. H. W. Liebenstein, at Adell, Wis.

Dr. W. G. Moore (Gr. Rap. '17), of Carlinville, Ill., recently started the construction of a veterinary hospital on South Broad St., Carlinville.

Dr. Arcadio C. Gonzaga (U. Phil. '26), of Laguna, Philippine Islands, has started for the United States where he will pursue postgraduate work.

Dr. Ormond Hummon (O. S. U. '30), of Leipsic, Ohio, has accepted a position in the Department of Veterinary Science, University of Wisconsin.

Dr. Alvin Broerman (O. S. U. '09), of Reynoldsburg, Ohio, is reported to be recovering from a serious operation performed the latter part of March.

Dr. C. M. Haring (Corn. '04), of Berkeley, Calif., was elected a councillor of the Pasteur Society of Central California, at the recent annual meeting.

Dr. Fred Miller (Chi. '91), for many years located at Fort Recovery, Ohio, has removed to Chattanooga, Ohio, and is now engaged in general practice there.

Dr. Ching Sheng Lo (K. S. A. C. '23), formerly located in Shanghai, is now at the College of Agriculture, Sun Yat Sen University, Tung-Shan, Canton, China.

Dr. G. A. Gettelman (Chi. '07), of Hartford, Wis., gave a lecture on cattle diseases, before the Beacon Light Lodge, Knights of Pythias No. 127, at the March meeting.

Dr. W. H. Hilts (K. S. A. C. '18), of Reno, Nevada, has resigned his position as Director of the Division of Animal Industry, Nevada State Board of Stock Commissioners.

Dr. J. N. Jerome (St. Jos. '15), formerly of Urich, Mo., has removed to Springfield, Mo., where he will be associated with Dr. H. P. Gray (West. '05) in general practice.

Dr. A. M. McCapes (Colo. '27) has resigned his position at the Oregon Agricultural College, effective June 1, to accept a position at the University of Missouri, at Columbia.

Dr. O. V. Brumley (O. S. U. '97), of Columbus, Ohio, was elected president of the Northwestern Ohio Veterinary Medical Association, at the annual meeting held in Toledo, March 4.

Drs. Benjamin McInnes (Edinburgh '74) and B. Kater McInnes (U. P. '11) were official veterinarians at the sixth annual horse show, held at Charleston, South Carolina, March 30-31, 1931.

Dr. W. N. Armstrong (Ont. '94), of Concord, Mich., is president of the Southern Michigan Fair and Racing Circuit, which held a large meeting at the Elks Temple, Jackson, Mich., recently.

Dr. G. E. Golden (McK. '07), who was connected with the U. S. Bureau of Animal Industry, at Sioux City, Iowa, for a number of years, has located permanently at Huntington Park, Calif.

Dr. Kenneth Ross (Ont. '27), formerly associated with Dr. A. L. Tow (Ind. '18), of Detroit, Mich., is now operating the Blue Cross Animal Hospital at 12463 Grand River Ave., Detroit, Mich.

Dr. C. W. Eddy (O. S. U. '00), formerly of Detroit, Mich., is building a new veterinary hospital at 3612 Lee Road, Shaker Heights, Ohio, which he plans to open to the public sometime this month.

Dr. A. C. Etchison (Chi. '10), of Assumption, Ill., gave a postmortem demonstration on a chicken, before a class in animal husbandry, at the Assumption Township High School, the latter part of March.

Dr. E. G. Bailey (K. C. V. C. '18) has removed from Chilhowee, Mo., to Urich, Mo., where he has taken over the practice left by Dr. J. N. Jerome (St. Jos. '18), who recently moved to Springfield, Mo.

Dr. John H. Gillmann (St. Jos. '17) has leased the building at 769 Vance Ave., Memphis, Tenn., for a veterinary hospital. Dr. Gillmann will have Dr. E. B. Mount (K. C. V. C. '14) associated with him.

Dr. W. H. Welch (Chi. '92), Chief Veterinarian, Illinois Department of Agriculture, injured his foot, the latter part of March, while the offices of the Division of Animal Industry were being moved from the State House to the Centennial Building Annex.

Dr. A. E. Erickson (Gr. Rap. '18), of Charlotte, Mich., recently had his automobile stolen from his garage. The car was recovered the following day and bore evidence of having been in a wreck. His medicine case was found by the side of a road several miles northwest of Charlotte.

Dr. N. E. Christenberry (Ind. '23), who has been in charge of the Blue Cross Animal Hospital, operated by Drs. E. E. (Gr. Rap. '01) and J. E. (Ont. '25) Patterson, of Detroit, Mich., for the past several years, is now associated with Dr. A. L. Tow (Ind. '18), at 6108 Stanton Ave., Detroit.

Dr. E. D. King, Jr. (A. P. I. '16), city meat and milk inspector of Valdosta, Ga., recently completed a tuberculin test of the 694 cows supplying milk to Valdosta, without finding a single reactor. Dr. King reports that Bang's disease is practically non-existent among the herds in Lowndes County, in which Valdosta is located.

Dr. Frank H. Suits (K. C. V. C. '16), of Odessa, Mo., is building an up-to-date veterinary hospital. Equipment for handling surgical cases in large animals will be a feature of the new building. The horse is still the source of most of the power used on the farms in Dr. Suits' community, which is located in one of the best farming sections of western Missouri.

Dr. R. L. Brinkman (Cin. '17), of Live Oak, Fla., agent for the Florida Live Stock Improvement and Sanitary Board, recently purchased a carload of 23 Aberdeen-Angus bulls, in Tennessee, for shipment into Florida for use in counties that have been freed from the cattle tick. This was the ninth trip that Dr. Brinkman has made, for the same purpose, during the past five years.